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1938

DOMINION RESEARCH FOUNDATION
CALCUTTA

PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when standing alone or in a syllable which ends in silent *e* or when ending an accented syllable.

S is always soft, and never has the sound of *z*.

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch*, as in Bach: (**Bach**, *baK*).

N for the French *n*, as in Breton: (**Breton**, *bre toN*).

ö for the German *ö*, as in Göttingen: (**Göttingen**, *gö'ting en*).

ü for the German *ü*, as in Blücher: (**Blücher**, *blüK'ur*).

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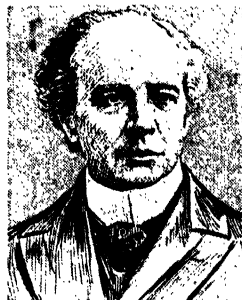
LAUREL, *law' rel*, Miss., founded in 1894, is the county seat of Jones County, ninety miles southeast of Jackson, in the heart of the yellow pine district, on the New Orleans & Northeastern, the Gulf and Ship Island and the New Orleans, Mobile and Chicago railroads. Pine lumbering is the chief industrial item which has contributed to the rapid growth of the town. There are also a foundry and a wagon works. There are a city hall, Federal building, two hospitals, and a Y. M. C. A. The state fair is held near the city. Population, 1930, 18,017.

LAURENTIAN PLATEAU, or **CANADIAN SHIELD**, a vast watershed extending on all sides from Hudson Bay and covering an area of more than 1,800,000 square miles, or about half the area of Canada. Because it is roughly triangular in shape, with its base on the Arctic Ocean and its apex south of Lake Superior, the plateau is sometimes called the Canadian Shield. The Laurentian Plateau extends westward nearly to the Mackenzie River and its easternmost section includes Labrador (see map opposite page 660). North of the Saint Lawrence River in Quebec there is a group of picturesque highlands called the Laurentian Mountains, but there are no high peaks in the Shield except along the Labrador coast. For the most part, the plateau is not over 1,000 to 2,000 feet above sea level.

The rocks of the Laurentian area are among the oldest of those forming the continental mass of North America. Through the wearing action of the great ice sheets and other agents of erosion, the higher areas were leveled down and the rocks stripped of their soil. Except for small isolated areas, the great northern part of the Shield is a wilderness of forests, lakes and rivers, mostly untouched by civilization. The important northern streams all flow into Hudson Bay. The southern section includes the drainage system of the Saint Lawrence, the valley of which is a prosperous and fertile farming region. A low ridge, called the Height of Land, lying about 250 miles north of the Saint Lawrence, runs parallel with that stream as far as Ontario and separates the waters of its basin from those flowing into the eastern side of Hudson Bay. See **CANADA**, subhead *Surface and Drainage*.

LAURIER, *lo'ri a*, WILFRID, SIR (1841-1919), the first French-Canadian to serve as Premier of the Dominion. He was born at

Saint Lin, Que., and educated at L'Assomption College and McGill University. After a number of years of law practice and journalism, he was elected to the Quebec assembly in 1871, and three years later to the House of Commons, where he quickly rose to prominence. In 1877 he became Minister of Inland Revenue in the Liberal government of Alexander Mackenzie. After the defeat of the Mackenzie government in 1878, Laurier became one of Edward Blake's chief lieutenants in the Opposition, and on Blake's retirement in 1887 he became the recognized leader of the Liberal party and the most powerful man in the Dominion.



LAURIER

In 1896, when the Liberals carried the country, Laurier was called upon to form a Ministry. The following year he received the honor of knighthood. The chief features of his administration, which lasted from 1896 to 1911, were the enactment of special tariffs for goods imported from Great Britain, the sending of Canadian troops to South Africa during the Boer War, the contract with the Grand Trunk Railway for the construction of a new transcontinental railroad, the reduction of the postal rate from three to two cents for domestic postage and from five to two cents for Great Britain, the United States and Mexico, and the formation of the provinces of Alberta and Saskatchewan. In 1910 he arranged a reciprocity treaty with the United States, but the Liberals lost the election on this issue, and the Laurier Ministry resigned on October 6, 1911. Sir Robert Borden (which see) became Premier. Sir Wilfrid then assumed leadership of the Opposition. During the World War he urged his followers to support the war program of the government, except on the question of conscription. He was a polished orator and a man of high ideals, and his administration of fifteen years was a conspicuous era in the development of Canada as a unified nation. Never did he cease to advocate coöperation between the French and English peoples.

LAUT, AGNES CHRISTINA (1871-1936), a Canadian author, born at Stanley, Ontario,

educated at Manitoba University. She became an editorial writer on the *Manitoba Free Press* in 1895 and later was correspondent for United States, Canadian and English publications. Miss Laut is well known as the author of a number of books on Canadian history and biography.

LAVA, *lah'va*, the general name for all rocky matter which flows or has flowed in a molten state from volcanoes and which, when cooled forms varieties of tufa, trachyte and basalt, according to the proportions of feldspar, hornblende and augite which enter into its composition. The texture of rocks formed from lava depends upon the rapidity with which the mass has cooled. When cooled rapidly the lava forms a compact rock. If cooled slowly, the rock is porous and often brittle and easily crumbled. Lava beds occur in two forms; those which have been deposited by the overflow of volcanoes, and are found on the sides and at the base of volcanic mountains, and those which have been forced up between other layers of rock and have cooled in this position.

LAVAL, **PIERRE** (1883-), A French Socialist statesman, who began his political career in 1914 by election to the Chamber of Deputies. The World War turned him to the army, but in 1924 he was elected again to the Chamber. He left his party to be Minister of Public Works in the Painlevé Cabinet, then was Secretary-General in the Briand Cabinet (1925), soon becoming Minister of Justice, in which post he secured social insurance laws. In 1931 he became Premier, and his administration was busy with general European affairs. With the deepening of the depression the Cabinet dissolved, but in 1932 he was Premier again for a short time. His third appointment to the post was in 1935, when he was confronted with the crisis provoked by Italy's war in Africa. The Cabinet fell early in 1936.

LAVAL, *la vahl'*, **UNIVERSITY**, a Canadian educational institution, established at Quebec in 1852, under the auspices of the Roman Catholic Church. It maintains departments of theology, law, medicine and arts. The faculty numbers over seventy, and there are about 475 students. The library contains 140,000 volumes, and the museum has one of the most complete collections of Indian relics in America. At Montreal there is an affiliated university, established in 1876. It is independent in administration,

and has full control of its educational affairs, but degrees are awarded by the Quebec institution.

François Xavier de Laval Montmorency (1623-1708), for whom the university was named, was a French churchman, born at Laval, France. He became a priest at twenty-three and a few years later became archdeacon of Evreux. In 1659 he was sent to Canada, as a special envoy of the Pope, and in 1668 established the Seminary of Quebec, besides actively engaging in the upbuilding of French and Roman Catholic influence in the region.

LAVENDER, a fragrant shrub, three or four feet high, which is native to Southern Europe. From the flowers of the lavender is extracted an oil used in making perfume. The oil is pale yellow, and has an aromatic odor and a "hot" taste; it is used as a medicine. Lavender water is a solution of oil of lavender, flavored with attar of roses, bergamot, musk, cloves or other preparation. Florida water, a favorite American perfume, is largely prepared from lavender.

LAW, as a feature of government, may be defined as follows:

(1) It is a rule of conduct, prescribing what must be done or shall not be done, made effective by competent authority, as a city council, a legislature, Congress or Parliament.

(2) It includes the entire compilation of such enactments.

(3) It includes the science which investigates and reaches decisions on all phases of human conduct bearing upon the personal and business relations of men.

Law in the first meaning given above originated in custom, in the precedents of the action or forbearance from action of individuals, kinsmen, tribes and finally, of the community as a whole, or society. Eventually, the necessity of establishing tribunals for settling controversies became apparent, and the decisions of these tribunals gave to precedent a much greater force and eventually practically established laws by declaring what previous custom had been. Gradually these tribunals or courts evolved a new set of rules, not founded entirely upon precedent, but upon common sense and conscience (see **EQUITY**). It was not a long step from law making by judges to the establishment of a special law-making body, or legislature. Thus, the three great branches of law were developed, *common law*, or the law of custom; *equity*, or the law of right, and *statutory law*.

Law in its modern sense is said to be of two kinds, *substantive*, which deals with principles of right to be followed, and *remedial*, which deals with procedure in case of violations, that is, with the arrest and trial of offenders. Substantive law is in turn divided into *public law*, which deals with the state and its relations, and *private law*, which concerns private persons and property.

Another division of public law is sometimes made. It is said to consist of *international law*, or the law recognized between nations, *constitutional law*, which regulates the organization and the relations of the parts of a single state and *administrative law*, which regulates the procedure of the various organs of government. Remedial law has to do not only with civil and criminal procedure, but with the classification of crimes and penalties.

This article treats only of the fundamental principles and the general organization of the subject of law. The many variations in the treatment and framing of laws by different nations and races cannot be profitably discussed except in many volumes.

Related Articles. Consult the following titles for additional information:

Admiralty	Expectation
Admiralty Court	Ex Post Facto
of Canada	Extradition
Adoption	False Imprisonment
Affidavit	False Pretenses
Age	Finger Print Identification
Agent	Flotsam, Jetsam and Ligan
Alias	Franchise
Anti-Trust Laws	Garnishment
Appeal	Garrote
Arrest	Guarantee
Assignment	Guardian
Attachment	Guillotine
Attainder	Habeas Corpus
Bail	Hanging
Bankrupt	Heir
Barrister	High Seas
Benefit of Clergy	Homestead Laws
Bertillon System	Husband and Wife
Bill of Attainder	Impeachment
Bill of Rights	Imprisonment for Debt
"Blue Sky" Laws	Indeterminate Sentence
Bona Fide	Injunction
By-law	International Law
Capital Punishment	Intestacy
Chancery	Judge
Chattel	Judgment
Civil Law	Judicial Department of Canada
Code Napoleon	Jury and Trial by Jury
Commercial Law	Juvenile Court
Common Carrier	Labor Legislation
Common Law	Lease
Contempt	Libel
Contract	License
Convict Labor	Lien
Copyright	Lynch Law
Court	Malice
Court of Claims	Martial Law
Crime	Morals Court
Criminology	Mortgage
Deed	Navigation Acts
Demurrer	Negligence
Easement	Neutrality
Eminent Domain	Notary Public
Enemy	
Equity	
Estate	
Exchequer Court of Canada	
Executor	

Nuisance	Search, Right of
Oath	Slander
Parent and Child	Statute
Parliamentary Law	Subpoena
Patent	Sumptuary Laws
Peer	Supreme Court
Perjury	Supreme Court of Canada
Personal Liberty	Title
Personal Property	Torrens System
Petition	Tort
Pillory	Torture
Power of Attorney	Treadmill
Preemption	Treason
Primogeniture	Trespass
Prison	Trustee
Probate	Usury
Procedure	Wager
Public Defenders	Warrant
Pure Food Laws	Wheel
Quorum	Will
Rack	Witness
Reform Schools	Writ
Retainer	
Riparian Rights	

JURISTS AND LAWYERS

Alverstone, Lord	Hughes, Charles
Blackstone, Sir William	Evans
Brandeis, Louis	Ingersoll, Robert G.
Brewer, David	Jay, John
Cardozo, Benjamin N.	Kent, James
Chase, Salmon P.	Lamar, Lucius Q. C.
Choate, Joseph Hodges	Marshall, John
Davis, David	Reading, Marquess
Fuller, Melville Weston	Roberts, Owen J.
Gray, George	Stone, Harlan F.
Harlan, John Marshall	Taney, Roger
Holmes, Oliver Wendell, Jr.	Brooke
	Walter, Morrison R.
	White, Edward L.

LAW, ANDREW BONAR (1858-1923), a British statesman, born in the Canadian province of New Brunswick and educated in Scotland. Before he became prominent in politics he was a successful iron manufacturer, attaining a partnership in one of the largest iron establishments in Glasgow. In 1900 he was elected to the House of Commons as a Unionist; two years later he was appointed Parliamentary Secretary of the Board of Trade, and in 1911 became leader of the Opposition in the House. Law held the position of Secretary of State for the Colonies in the Asquith coalition Cabinet of 1915, and in 1916, when Lloyd George formed a new Cabinet, he accepted the post of Chancellor of the Exchequer and became one of the five members of the War Council. In 1917 he resigned from the War Council, but continued the position of Chancellor of the Exchequer until the dissolution of Parliament in 1918. After the defeat of the Lloyd George Ministry in October 1922, he became Prime Minister, but the great burdens of the position and continued ill health led him to resign in May, 1923. He died October 30, 1923, and his ashes were buried in Westminster Abbey.

LAW, JOHN (1671-1729), a celebrated financier and speculator, son of a goldsmith of Edinburgh. In 1691 he went to England.

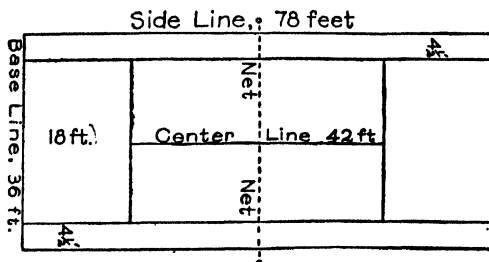
but was compelled to leave the country after a four years' residence, on account of a duel. Having made a fortune by gambling, he went to Paris and there set up a bank. His exceptional financial ability secured for him the confidence of the people, and in 1717 he floated the celebrated Mississippi Scheme and became powerful. But the large amount of paper currency issued caused the stock to depreciate, and in 1720 the Mississippi Scheme, with the bank, collapsed, and Law fled from France. See MISSISSIPPI SCHEME.



LAWN TENNIS, a modified form of an old English game, played with rackets and light rubber balls about $2\frac{1}{2}$ inches in diameter and thinly covered with felt. The ground, or *court*, on which tennis is played should be 78 feet long by 27 feet wide when two play, or 36 feet wide when four play. It should be laid on a level surface of turf or firm ground. The court is marked with white lines

indicating the boundaries, and the space is divided in the middle by a net 3 feet in height, stretched across from one side to the other. The accompanying diagram shows a court properly laid out. When two play, the narrow court only is used; when four play, the entire court. The racket is 8 inches wide and 15 inches long, and weighs from 12 to 15 ounces.

The object of the game is to knock the ball with the racket into the opponent's court, as explained later in this article, so that he



LAWN TENNIS COURT

cannot return it. Whenever this is accomplished, a score is made. The first point won by either side counts 15. The second point

won by either side makes its score 30, and the third, 40. The fourth point wins the game, unless each side has won three points, which would make the score of both teams 40. When the sides are tied at 40, the score is said to be *deuce*, and one side must win two points in succession in order to win the game. That is, the game continues until one side scores two points in excess of the other, and thereby wins. A *set* is played when either side has won six games, the side first winning this number of games winning the set. One modification of this statement is necessary. If in any set both sides have won five games, this becomes a *deuce set*, and neither side is the winner until it has won two games in excess of the other.

At the beginning of the game one player takes the ball and *serves* it; that is, he tosses it into the air and knocks it with the racket over the net and into the small square on the opposite side, near the net and diagonally opposite the server. It must be returned by the other player on the first bound after it strikes the ground. The server then returns the ball, either before it strikes the ground or on the first bound. The player who first misses the ball or knocks it outside of the outside lines or fails to knock it over the net, loses the point. There are numerous rules which govern the niceties of plays, and these may be learned from a manual of the game.



TENNIS RACKET

Lawn tennis is an excellent game, requiring great activity and skill and giving vigorous exercise. It is played by both sexes.

LAWRENCE, JAMES (1781-1813), an American naval officer, born at Burlington, N. J. In 1798 he entered the United States navy as midshipman. He served under Commodore Bainbridge in the War of 1812, and as commander of the *Peacock* captured the *Hornet*. This victory gained



for him the command of the *Chesapeake*. But a few days

after taking command of this ship he engaged in battle with the British ship *Shannon*. His ship was captured and he was mortally wounded. His dying words, "Don't give up the ship!" became the motto of the American navy.

LAWRENCE, KAN., the county seat of Douglas County, forty miles west of Kansas City, on the Kansas River and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific and the Union Pacific railroads. It is the seat of the state university, the Dyche Museum of Natural History, and Haskell Institute, an industrial school for Indians. The manufactures include flour, paper, lumber, brick and feed-mill products. There is a municipal airport. Lawrence was founded by the Emigrant Aid Society in 1854, and for a time was the headquarters of the antislavery party in the territory. Population, 1930, 13,726.

LAWRENCE, MASS., a county seat of Essex County, twenty-six miles northwest of Boston, on the Merrimac River and on lines of the Boston & Maine Railroad. There is an airport. The city has long been known for its extensive manufactures of cotton and woolen goods; it is the center of the American worsted industry. Silk, shoes and paper are other important industries. Population, 1930, 85,068.

LAWRENCE, THOMAS EDWARD (1888-1935), a British traveler, soldier and semi-legendary figure, called "Lawrence of Arabia." He was born in Wales. After his graduation from Oxford University, in 1910, he visited Syria, where he learned to speak Arabic. He was later associated with archaeological expeditions in Mesopotamia and Palestine. After the outbreak of the World War, in 1914, he was with the Intelligence Service in Egypt. His warm interest in the Arabs led him to take an active part in their struggle with Turkey, and he was present with the army of Feisal at the capture of Damascus. Angered because the Allies failed to make good their promises to the Arabs, Lawrence left the Intelligence Service and was subsequently with the Air Force, the Tank Corps and in India. An abridged account of his experiences was published in 1927 as *Revolt in the Desert*; a trade edition of the larger narrative, *The Seven Pillars of Wisdom*, was issued after his death. Lawrence changed his name to T. E. Shaw in 1927.

LAW SCHOOLS, educational institutions for preparing students for the legal profession. The first law school established in America was at Litchfield, Connecticut, in 1784. This was an entirely independent institution and continued for about fifty years, when it suspended.

The beginning of law schools as departments of the different colleges was in the form of courses of lectures on law, delivered in such institutions as the College of Philadelphia, Columbia and Harvard. Later, law departments were organized in these institutions, and these finally became law schools. In addition to schools of this nature, there are in the large cities of the country many independent law schools having courses similar to those connected with the universities. The standards for admission vary somewhat in different states. The best schools require a college course as preliminary to their work, and the law course occupies from three to four years. Other schools admit students without this preparation and do much more elementary work. Graduates are examined by state boards before being licensed to practice law.

LAWSUIT. See PROCEDURE.

LAWTON, HENRY WARE (1843-1899), an American soldier, born at Manhattan, Ohio. He entered the Union army in 1861 and served during the Civil War, attaining the brevet rank of colonel. In 1866 he was commissioned second lieutenant in the regular army, and later he was made inspector-general, with the rank of major. At the beginning of the war with Spain he was promoted to the rank of brigadier-general of volunteers and commanded the division that captured El Caney, July 1, 1898; as major-general he had command of the Department of Santiago. In 1898 he was assigned to the Philippines, where he rendered valuable service in putting down rebellion. He was killed in battle at San Mateo, in December, 1899.

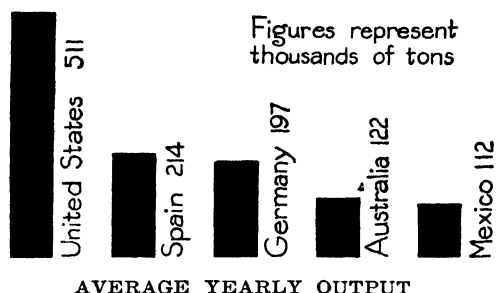
LAZARUS, a Bible name meaning *God hath helped*. It is used as (1) the name of the beggar in the parable of the rich man and Lazarus (*Luke XVI, 19-31*); (2) as the name of the brother of Martha and Mary, whom Jesus raised from the dead (*John XI, 1-44*).

LAZURITE. See LAPIS LAZULI.

LEAD, *led*, a soft metal of bluish-gray color, which, when cut, has a bright metallic luster, but soon tarnishes on exposure to

the air. It is about eleven and one-third times heavier than water and is easily indented or bent, but is not elastic. It is somewhat ductile and quite malleable, but it is not strong. Lead melts at a temperature of about three times that of boiling water, but it contracts on solidifying, and for this reason is not suitable for castings.

Lead is used for lining tanks and tea chests, in the manufacture of lead pipe and in making numerous alloys and compounds, such as solder, Britannia metal, powder, shot and type metal, which is a compound of lead and antimony. A number of compounds of lead are also in general use. Of these, the oxides,



litharge and *red lead*, are used in paints and the manufacture of glass, and the carbonate of lead, or *white lead*, forms the basis of many paints. *Lead acetate*, or *sugar of lead*, is used in coloring and sometimes for medicine. See LEAD POISONING.

Lead ore is quite generally distributed, but it is found in paying quantities in only a few localities. The most important ores are the *sulphide*, or *galena*, sometimes known as *lead glance* (see GALENA), and the *carbonate*, which often contains considerable silver and copper. Such ore is worked for various metals which can be obtained from it; considerable silver is obtained in the reduction of lead ore, and considerable lead in the reduction of silver ore.

The United States leads all countries in the production of lead; Spain is second, Germany has been third, Australia fourth, and Mexico, fifth, in output. In the United States the production is greatest in Missouri, Idaho, Utah and Colorado, in the order named.

LEAD, SOUNDING, a weight attached to a cord, used in casting into the water that the mariner may ascertain its depth, and thus avoid shoals and possible destruction to his ship. See SOUNDING.

LEAD, leed, S. D., in Lawrence County, thirty miles from the western boundary of the state, on the Chicago, Burlington & Quincy and the Chicago & North Western railroads. It is the chief city in the gold-mining center of the Black Hills, and there is some tungsten. The chief mine is called the Homestake, one of the richest gold producers in the world. There are manufactories of mining tools and camp supplies. The city has a business college, the Hearst Library and the Lead Coliseum. The commission form of government was adopted in 1912. Population, 1920, 5,013; in 1930, 5,733.

LEAD GLANCE, another name for galena (which see).

LEAD POISONING is caused by the presence of lead in the system. Lead is often contained in water or other beverages which have been in lead pipes or vessels, and it is not infrequently found in confectionery which has been colored and in wine that has been sweetened by lead preparations. Sufficient lead may be taken from any one of these sources to cause more or less serious illness, but the most frequent and virulent cases occur among painters and persons engaged in white lead factories. The effects of poisoning may manifest themselves in severe colic, in a species of rheumatism, in paralysis or, rarely, in brain diseases that terminate at length in delirium, convulsions and death.

LEADVILLE, *led'vil*, COLO., the county seat of Lake County, eighty miles southwest of Denver, on the Colorado Midland, the Denver & Rio Grande and the Colorado & Southern railroads. The city is picturesquely located at an elevation of 10,200 feet. Rich placers were discovered here in 1860 in California Gulch, but in a few years they were almost exhausted and the camp was practically abandoned, when, in 1877, rich silver and lead deposits were discovered. It then became widely known as a silver camp. After the decline in silver late in the nineteenth century, attention was again turned to gold mining, and for years the district has been a heavy producer of gold, also of zinc, copper, bismuth and manganese. The city contains large sampling, refining and reduction works and smelting furnaces. There is a Federal building, a Carnegie Library, an Elks' Opera House and a United States fish hatchery. Population, 1930, 3,771.

LEAF. See LEAVES.

LEAF INSECTS, the common name of a family of insects found in warm climates, especially in Australia, South America and the islands of the South Pacific. *Walking leaves* is another name for these insects, which are remarkable for their highly developed power of plant mimicry. There are about 600 species. Some have bright-colored wing-covers so closely resembling the leaves of plants they are mistaken for them, even by the insects themselves. In the so-called stick insects the body is wingless and lengthened to such a degree that it cannot be detected from a slender twig. The adults live in trees, and the females deposit their seed-like eggs carelessly on the ground from the branches, sometimes in such numbers that they sound like a shower of rain. These insects feed on leaves, and have been known to strip the trees bare over large areas in tropical forests. The American walking stick belongs to this family. See **PROTECTIVE COLORATION**, subhead *Mimicry*.

LEAGUE, *leeg*, a measure of length dating from the ancient period. At present it is a nautical measurement, equivalent to three nautical miles (the mile of 6,080 feet) and 3.456 statute miles (the mile of 5,280 feet). The French metric league is reckoned as equal to four kilometers, or 4,374 yards, or over 2.5 miles.

LEAGUE OF NATIONS. See **NATIONS**, **LEAGUE OF**.

LEAGUE TO ENFORCE PEACE, an organization formed at a conference at Independence Hall, Philadelphia, in 1915. It did not seek to influence the World War, then in progress, but it advocated a league of nations after the war, to establish and maintain a condition of law and order among all countries. The means to be employed were summarized in these proposals:

Article One. All justiciable questions arising between the signatories powers, not settled by negotiation, shall, subject to the limitations of treaties, be submitted to a judicial tribunal for hearing and judgment, both upon the merits and upon any issue as to its jurisdiction of the question.

Article Two. All other questions arising between the signatories and not settled by negotiation, shall be submitted to a council of conciliation for hearing, consideration and recommendation.

Article Three. The signatory powers shall jointly use forthwith both their economic and military forces against any one of their number that goes to war, or commits acts of hostility, against another of the signatories

before any question arising shall be submitted as provided in the foregoing.

Article Four. Conferences between the signatory powers shall be held from time to time to formulate and codify rules of international law, which, unless some signatory shall signify its dissent within a stated period, shall thereafter govern in the decisions of the judicial tribunal mentioned in article one.

William H. Taft, former President of the United States, became head of the League, which established headquarters in New York City. At the close of the World War Mr. Taft became one of the strongest advocates of the League of Nations. See **NATIONS**, **LEAGUE OF**.

LEAN'DER. See **HERO**.

LEAP YEAR, a year which has 366 days. It is probably so named because it "leaps" over a day more than a common year. Thus, in common years, if the first day of March is on Monday in the present year, it will the next year fall on Tuesday; but in leap year it will leap to Wednesday, for every leap year has a day added to the month of February. Every year which is exactly divisible by four is a leap year unless the number representing the year terminates in two ciphers, in which case it must be divisible by 400 to be a leap year. See **CALENDAR**.

LEASE, a contract for the temporary possession of land or buildings, or both. It may be for life, for a fixed period, or during the pleasure of the parties to it. Legally, a lease is an act or instrument whereby any estate or right in land less than a fee is created (fee being practically the equivalent of ownership). The party who leases is called the *lessor*, he to whom the lease is made is the *lessee*, and the compensation or consideration is the rent.

Every properly drawn lease includes the following principal clauses:

First, the date, which fixes the time for the commencement of the lease; if no date is mentioned, delivery of the lease constitutes the commencement.

Second, the names of the parties, the Christian names being written in full.

Third, the consideration. It need not be what is formally called rent, but it may be a sum of money in a lump sum, or grain, animals or personal service, or merely the affection of one party for the other.

Fourth, the operative clause or clauses, telling what the parties agree to do.

Fifth, the description of the premises. This description need not specify all the particulars; for example the general description of a farm includes all the buildings and lands

belonging to the farm. Almost any kind of property, real or personal, may be the subject of a lease—not only lands and buildings, but fisheries, rights of way and annuities.

Sixth, the limitations on the rights or liabilities of both parties, as to repairs, taxes, insurance, etc.

A short form of lease is given below:

THIS AGREEMENT, Made this seventh day of March, A. D. One Thousand Nine Hundred Forty-seven (A. D. 1947) Between Charles A. Marshall, party of the first part, and Horace Brooks Stevens, party of the second part.

WITNESSETH, That the said party of the first part does hereby lease to the said party of the second part, the following described property, situated in the City of Chicago, County of Cook and State of Illinois, viz: (here describe property) for the term of one year beginning the first day of May A. D. 1947, and ending the thirtieth day of April A. D. 1948.

And the party of the second part agrees to pay as rent for said premises, the sum of twelve hundred dollars, payable monthly in payments of one hundred dollars each on the first day of each month.

And the party of the second part covenants with the party of the first part, that, at the expiration of the term of this lease he will yield up the premises to the party of the first part without further notice, in as good condition as when the same were entered upon by the party of the second part, loss by fire or inevitable accident, and ordinary wear excepted, and will pay all assessments that shall be levied upon said premises during said term for water tax.

AND IT IS FURTHER EXPRESSLY AGREED between the parties, that if default shall be made in the payment of the rent above reserved, or any part thereof or in any of the covenants or agreements herein contained, to be kept by the party of the second part, his heirs, executors, administrators or assigns, it shall be lawful for the party of the first part, or his legal representatives to enter into and upon said premises, or any part thereof, either with or without process of law, to re-enter and repossess the same, and to distrain for any rent that may be due thereon, at the election of said party of the first part; and in order to enforce a forfeiture for nonpayment of rent, it shall not be necessary to make a demand on the same day the rent shall become due, but a demand and refusal or failure to pay at any time on the same day, or at any time on any subsequent day, shall be sufficient; and after such default shall be made, the party of the second part shall be deemed guilty of a forcible detainer of said premises under the statute.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals, the day and year first above written.

CHARLES ALFRED MARSHALL (Seal)
HORACE BROOKS STEVENS (Seal)

LEATHER, *leth'ur*, the dressed skins of animals, prepared by a process known as tanning. Most leather is made from the skins of cattle and horses, but the skins of mules, pigs, goats and sheep are also used. The leather made from the skins of large animals, such as the horse and the ox, takes the name *hide*, combined with the name of the animal, as *cowhide* and *horsehide*; that from the skins of small animals is named by combining the word *skin* with the name of the animal, as *sheepskin* and *calfskin*.

Tanning. When received by the tanner, hides are hard, rough and stiff. Those coming from a distance are usually cured by salting or drying, sometimes by both processes, so they will not quickly rot. Before they can be tanned the cured hides need to be brought back as far as possible to the condition of fresh hides. This is done by soaking and softening them in water, to which, sometimes, salt or carbolic acid is added. Softening is generally hastened by the use of machines, which subject the skin to a kneading process. The hair is then removed by the use of lime, the customary method being to spread the hides in a tank containing milk of lime and to expose them frequently to the air. After the hair has been loosened by this process, it is scraped from the hides, either by hand or by machines.

After being thoroughly cleansed to remove all traces of lime or other matter, the skins are placed in the tanning vats, which contain a solution made by soaking ground oak or hemlock bark in boiling water. The skins are first placed in a weak solution of the liquor, and as the process continues they are changed from this to one a little stronger, and so on until the process is completed in the liquor of greatest strength. The gradation is necessary to secure a thorough tanning of the hide and to prevent the formation of hard and brittle leather. The tanning of large hides from horses and cattle requires from four to twelve months by this process. Skins from smaller animals can be tanned much more quickly. In some works a chemical process, called the chrome process, is now employed, especially for the manufacture of the leather used for the uppers of shoes and other purposes where great strain is not required. Sheepskins and goatskins are prepared by a process called *tawing*. In this process bran and alum take the place of the tan bark and produce a very soft, pliable leather, which is extensively used in making gloves and mittens and the uppers for women's shoes.

Kinds of Leather. Sole leather for shoes and boots is made from the thick parts of horsehide and cowhide, found along the back. Boot and shoe upper parts are made from the thin portions of these skins or from the skins of smaller animals, such as calf, sheep and goat. From goatskins various grades of *kid* and the so-called *Morocco*, extensively used in bookbinding, and making pocket-

books and other fine leather articles. An imitation Morocco is also made from sheepskin. *Cordovan* is made from horsehide and is waterproof. *Patent leather* is made by treating the tanned skin with coatings of lamp-black and oil, each of which is allowed to dry, and by rubbing down with pumice stone. The finishing coat contains varnish, after the application of which the leather is baked.

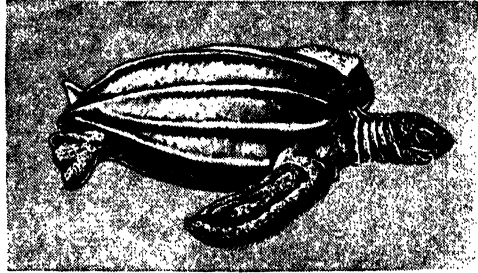
Artificial Leather, the name for certain materials which resemble leather in general appearance and are used for practically the same purposes. The demand for leather has exceeded the supply for a number of years, and it has been necessary to produce some article which could take its place. The first substitute was made in America in 1849, and was called leather cloth. The method of manufacture was as follows: The cloth was covered with oily pigments, was then dried in a heated oven, and after passing between rollers was covered with pumice dust, to make it smooth, after which it was coated several times with enamel paint. Another kind is now made of leather parings and shavings, which, on being reduced to a pulp, are molded into sheets or other required forms. Still another kind, called *vegetable leather*, consists of rubber dissolved in naphtha and spread over linen cloth.

A more modern substitute is *pantasote*, which is, however, a trade name and conceals the identity of the constituent elements which enter its manufacture. So nearly like leather in appearance is pantasote that only those who habitually handle leather can distinguish the genuine article from the other in a manufactured article. Pantasote is used in "leather" chair upholstery and for automobile seats and tops.

Fabricord, the most recent substitute for leather, consists of a base of cotton cloth which is coated with tough, flexible material and finished by steel plates and rollers to give it the flexibility and appearance of leather. The best grades are waterproof, and are used for upholstering automobile seats, also for tops of the open-car variety. Lighter grades are used for drapery and wall furnishings and in bookbinding.

LEATHERBACK, or **LEATHERBACK TURTLE**, a marine turtle found in all tropical seas, but most frequently in the western part of the Atlantic Ocean. It sometimes comes as far north as Long Island, in the United States, and as far north as France,

in Europe. This is the largest turtle known, and specimens measuring six feet in length and weighing upwards of a thousand pounds



LEATHERBACK

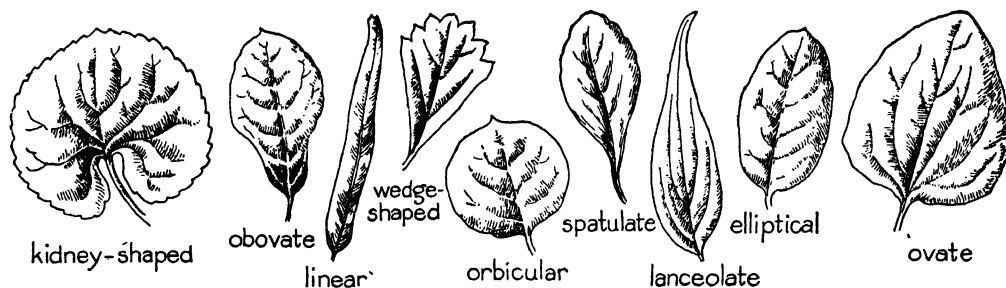
have been found. The brown shell is soft and leathery. The flesh is not suitable for food.

LEAVENWORTH, *lev'en worth*, KAN., the county seat of Leavenworth County, eighteen miles northwest of Kansas City, on the Missouri River and on the Atchison, Topeka & Santa Fé, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago Great Western, and the Union Pacific railroads, four of the nation's great trunk lines. The city is an important commercial center. The manufactures include brick, stoves, furniture, machinery, flour and wagons, and there is a packing house. Among the chief buildings are the Cathedral of the Immaculate Conception, a city orphanage, two hospitals, a Federal building, a courthouse and Whittier Library. The United States has a large penitentiary for civilian convicts here, and near the city is the state prison and a national soldiers' home. On the north is Fort Leavenworth military reservation, at which a military school for post-graduate courses for subaltern officers is maintained. There are several hospitals and asylums. A conspicuous object in the town is a large bronze statue of Ulysses S. Grant. The commission form of government was adopted in 1909. Leavenworth was settled by Southern sympathizers in 1854, and was chartered the next year. Population, 1920, 16,901; in 1930, 17,486, a gain of 3 per cent.

LEAVES, *leevs*, the foliage of trees, contribute so much to the beauty of the plant kingdom that the average observer fails to consider the service they render in helping sustain the life of plants. First of all, leaves manufacture starch and sugar upon which plants feed. In the leaf covering, or epi-

dermis, there are numerous small openings. Through these, carbon dioxide is taken into the inner cells of the leaf, which contain a wonderful substance called *chlorophyll*. It is this substance that gives leaves their green color. Water is carried into the leaves from

breathing is much less than the amount of the same gas given off in starch making; and the amount of carbon dioxide given off in breathing is small compared with the quantity absorbed in starch making. It thus happens that plants and animals help to

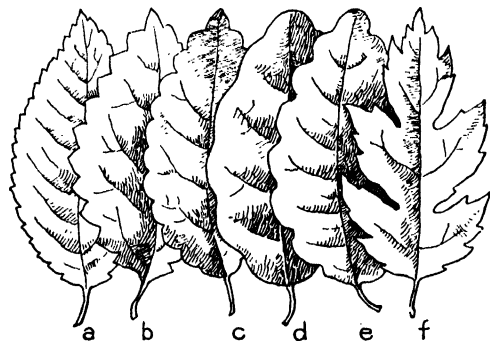


VARIATIONS IN GENERAL OUTLINE

the soil by way of roots and stem, and the water and carbon dioxide are the raw materials out of which sugar and starch are made. The energy necessary for this process is absorbed from the sun by the green coloring matter.

The leaves also serve as the lungs of the plant. That is, oxygen is absorbed from the air through the openings in the epidermis, and carbon dioxide is given off, just as human lungs absorb oxygen and give off carbon dioxide. During the process there goes on a decomposition of certain substances, as a result of which there is a release

maintain the proper balance of these gases in the air, for animals must have oxygen and plants carbon dioxide to keep alive. Carbon dioxide is poisonous to animals, but is essential to plant life.



- a-serrate, or saw-toothed
- b-dentate, or toothed
- c-crenate, or scalloped
- d-repand, undulate, or wavy
- e-sinuate
- f-incised, cut, or jagged

MARGINAL FORMS OF LEAVES

of energy. This energy is used by the plant to do its work. It is an interesting fact that the amount of oxygen absorbed by plants in



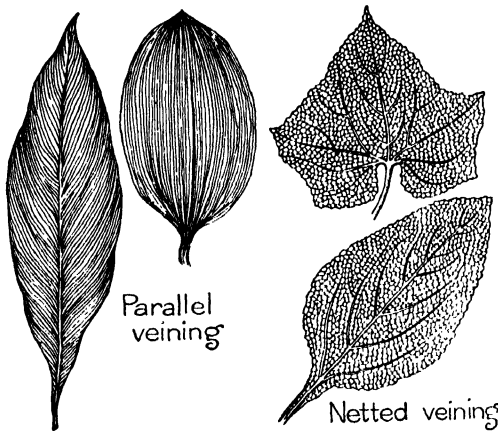
GROWTH FROM THE BRANCHES

Another function of leaves is that of giving off water into the air, a process called *transpiration*. This moisture is the surplus water of the crude sap which comes up from the soil into the plant tissues.

Leaves are arranged on the branches in a certain definite, regular order, always the same in the same species. Usually as they grow they arrange themselves in this definite order, so as to expose the largest possible surface to light and moisture. A typical leaf consists of an expanded blade and a stem, with, in some species, two small bracts at the base. The blade may be a simple and rounded expansion of the stem, with

a perfectly smooth outline, or it may be notched or cut and divided, or be found in any one of the hundreds of intermediate shapes, even to the delicately dissected feathery-like leaf of the acacia.

Leaves of trees change their color in the autumn in preparation for the winter, and the gorgeous reds and yellows are not the work of Jack Frost, as some suppose. When cool weather heralds the approach of winter the leaves no longer carry on their work of making plant food, for during the winter months the plant is to be nourished by stored-up food in its cells. Accordingly, the chloro-



VENATION OR VEINING

phyll is broken up into the substances of which it is composed, and the food that remains is transmitted to the tree to be used during the winter months. The chemical changes that take place in the breaking up of the chlorophyll bodies cause the leaf to change its color. At the point where the stem of the leaf is attached to the tree a layer of cork cells forms, and in course of time the leaf is severed at this point and falls. Dead leaves are an aid in fertilizing soil, as the rains wash out and dissolve the mineral substances contained in them. See PLANT; TREE.

LEBANON, MOUNTAINS OF, two nearly parallel ranges in the north of Palestine, extending parallel with the coast of the Mediterranean. The range on the west is called Lebanon, and that on the east, Anti-Lebanon. The former is by far the loftier range of the two and presents an almost continuous ridge, the loftiest summit of which is over 10,000 feet above the sea. Though under the snow limit, snow and ice remain throughout the

year in the higher ravines. The ranges were formerly famous for their cedars; there were but a few hundred of the trees left in 1914. These were the "cedars of Lebanon" used by Solomon in the building of the Temple. The Germans in their campaign in Palestine in the World War destroyed most of these. In the southern part of the chain the Upper Jordan has its source. See PALESTINE.

LEBANON, PA., the county seat of Lebanon County, twenty-five miles east of Harrisburg, served chiefly by the Philadelphia & Reading Railroad. The city is in the Lebanon Valley, between the Blue and the South Mountains. There are also deposits of iron (the famous Cornwall mine being within five miles of the city), brownstone, limestone and brick clay in the vicinity. The industries are mainly mining, the manufacture of iron and steel, quarrying, brick-making and manufacturing of silk, machinery, nuts and bolts, chains, chemicals, and furniture. The city has a Federal building, a Y. M. C. A., a city hall and an armory. The place was settled by Germans about 1700. It was incorporated in 1820, and was chartered as a city in 1885. There is commission government. Population, 1930, 25,561.

LECKY, lek'i, WILLIAM EDWARD HARTPOLE (1838-1903), an English historian, born in Ireland and educated at Trinity College, Dublin. His *Leaders of Public Opinion in Ireland* was published anonymously, but with the publication, four years later, of the *History of the Rise and Influence of the Spirit of Rationalism in Europe*, he gained a wide reputation. He became the representative of the University of Dublin in Parliament, where he attained distinction as a speaker and later was called to the Privy Council, but resigned in 1902. His best works besides those mentioned are *History of European Morals from Augustus to Charlemagne*, *History of England in the Eighteenth Century* and *Democracy and Liberty*.

LECOMPTON CONSTITUTION, a constitution adopted by a convention held at Lecompton, Kan., in 1857. It contained provisions declaring the legality of slavery in Kansas, prohibiting emancipation and forbidding the amendment of the instrument for seven years. The only portion submitted to the vote of the people was the question of the extension of slavery in the state, the rights of the present slave owners being declared inalienable. In the election the con-

stitution was adopted, the free-state men declining to vote and the slavery vote being swelled by Missouri voters. In an election over the same instrument held under the auspices of the free-state legislature, the constitution was rejected in January, 1858. After a long contest in Congress it was voted that it should be again submitted to the people and the acceptance of the constitution was a prerequisite for admission. It was again rejected, however, and an anti-slavery constitution was adopted in 1859. See KANSAS, subhead *History*.

LE CONTE, *le kont'*, JOSEPH (1823-1901), an American geologist who did much to popularize the science of geology throughout America. He was born in Liberty County, Ga., and educated at Franklin College and the College of Physicians and Surgeons in New York City. At Harvard University he studied under Agassiz, whom he accompanied on a scientific expedition to Florida. Later he was made, successively, professor of natural science in Oglethorpe University, professor of natural history in Franklin College, professor of chemistry and geology in the University of South Carolina and professor of geology in the University of California, which position he held until his death. Le Conte wrote many valuable works, among which are *Religion and Science*, *Elements of Geology* and *Compend of Geology*.

LEE, CHARLES (1731-1782), an American Revolutionary general. He was the son of a British officer, took part in Braddock's campaign in 1755 and served during the last French and Indian war. He then returned to England, but removed to America in 1773, and on the outbreak of the war he was appointed major-general, by Congress. He took part in the siege of Boston, commenced the fortifications around New York and was given credit for the victory at Charleston, S. C., in 1776, though William Moultrie deserved the honor. Lee was captured in the autumn of that year, but was exchanged in time to take a command in the Battle of Monmouth. In that battle he disobeyed orders and nearly caused the defeat of the Americans. For this he was suspended from his command for a year. Later it was learned that he had been a traitor while in the hands of the British, for he had disclosed plans of Washington. Not long afterwards he fought a duel and was wounded. An impudent letter to Congress regarding this event led to his

discharge from the army and he died soon afterwards.

LEE, HENRY, called LIGHT-HORSE HARRY (1756-1818), an American soldier and statesman of the Revolutionary period, was born at Leesylvania, Va., and educated at Princeton College. In 1776 he was appointed captain of a company of cavalry in Colonel Bland's Virginia regiment, and in the following year he joined Washington's army just before the Battle of Brandywine. He served through the war as scout, and he had command of the brilliant expedition against the British at Paulus Hook. In the memorable retreat of Greene before Lord Cornwallis, Lee's legion acquired fame as the rear guard of the American army, the post of greatest danger, and at the battles of Guilford Court House and Eutaw Springs, Lee especially distinguished himself. On the conclusion of the war he was sent to Congress as a delegate from Virginia, and in 1792 he was chosen governor of that state.

After the death of Washington Lee was chosen to deliver the funeral address before Congress and was the author of the oft-repeated phrase, used on that occasion, "First in war, first in peace, first in the hearts of his countrymen." He retired from public life in 1801, but in 1812 became a major-general when trouble with Canada threatened. He died while returning from a voyage to the West Indies.

LEE, RICHARD HENRY (1732-1794), a distinguished American of the Revolutionary period, was born at Stratford, Virginia. He was chosen a delegate to the House of Burgesses, and in opposition to unjust British claims he played an important part. On being sent as delegate to the first Colonial Congress at Philadelphia (1774), he was at once recognized as a leader. He drew up many addresses to the king and the English people, which were admitted, even by his political opponents, to be unsurpassed by any of the state papers of the time. On June 7, 1776, he introduced the motion finally breaking political connection with Britain. In consequence of poor health, he was unable to serve in the field, but his activity at home was unceasing and extremely valuable. In 1784 he was unanimously elected president of the Congress. He opposed the ratification of the Federal Constitution, but later entered the Senate as an Anti-Federalist.



LEE, ROBERT EDWARD (1807-1870), an American general, commander in chief of the Confederate army and one of the most skilful tacticians who took part in the Civil War. Lee's personal bravery, his irreproachable life and his splendid idealism have made him a commanding figure in American history, and to-day his memory is revered by the North as well as the South. He was the son of the Revolutionary cavalry leader, "Light-Horse Harry" Lee, and was born in Westmoreland County, Va., on January 19, 1807. In 1829 he left the Military Academy at West Point with the rank of second-lieutenant of engineers. After serving for a time as chief engineer of the army in Washington, and superintending the construction of defenses in New York Harbor, he was appointed in 1847 engineer in chief of the army of the Mexican campaign. His brilliant services at Cerro Gordo, Contreras, Churubusco and Chapultepec gained for him the rank of colonel. From 1852 to 1855 he was superintendent of military studies at West Point, and in 1855 he was made lieutenant-colonel of cavalry.

In 1861 Lee became colonel of his regiment, but on the secession of Virginia from the Union he threw up his commission and, despite the fact that he was strongly opposed to disunion, accepted the command of the Virginian army and subsequently was selected by President Davis as commander in chief. In June, 1862, he defeated the Federal army under McClellan in a series of battles around Richmond, and, aided by "Stonewall" Jackson, he defeated Pope in a number of engagements commencing August 20 and ending with the victory of Manassas Junction on the thirtieth. Lee then crossed the Potomac into Maryland to threaten Washington itself, but a series of checks obliged him to withdraw behind the Rappahannock. The plan of the Federals now was to advance on Richmond, but this was prevented by Lee, who on December 13, defeated Burnside at Fredericksburg, and on May 2 and 3, 1863, gained the victory of Chancellorsville over Hooker.

After this series of victories Lee resolved

on an invasion of Pennsylvania, but was beaten by Meade at Gettysburg, July 1, 2 and 3, and forced to retreat into Virginia. The campaign of 1864 was begun by the advance of General Grant on May 4. A succession of stubbornly contested battles followed, from the "Wilderness," by way of Spottsylvania and Cold Harbor, to Petersburg. On April 2, 1865, Grant broke through Lee's defenses, and Lee's attempt to unite with Johnston was prevented. The Union forces with their great superiority of men gradually hemmed in the Confederate army, which on April 9 surrendered to Grant at Appomattox Court House. General Lee retired into private life, but in October following the end of the war he was elected president of Washington College, Lexington, Va., now Washington and Lee University. There he remained until his death.

LEECH, the common name of certain worms which are provided with sucking disks, one at each end of the body. The body consists of rings or segments, very numerous and closely set. Leeches chiefly inhabit fresh-water ponds, though some live among moist grasses and some are marine. They breathe through the general surface of the body or through little pouches. In Ceylon there are land leeches, which live in damp foliage and are often a serious pest to travelers. In those species generally employed for medicinal purposes, the mouth is situated in the middle of the anterior sucker and is provided with three small white teeth capable of making a peculiar Y-shaped wound, which is difficult to close and permits a large flow of blood. After the leeches are satiated and have detached themselves, they will disgorge the blood they have drawn if placed in a weak solution of salt.

LEEDS, *leedz*, ENGLAND, the fifth city in size in the country, is situated on the River Aire, with sea connection by the Humber, and is twenty miles southwest of York. Leeds has been for generations the chief site of the woolen manufacture of Yorkshire. The city is situated in a rich coal and iron district, and the iron industry is almost as important as the cloth industry. Among the chief buildings and institutions are Saint Peter's Church, Saint John's Church, the townhall, the royal exchange, a grand theater, Mechanics' Institute, Central Public Free Library and University of Leeds. Near by is the Kirkstall Abbey, a magnificent ruin.

Besides cloth and iron manufactures, there are manufactures of boots and shoes, locomotives, agricultural machines, glass, tobacco, oil, worsted, silk and pottery. Nearly a hundred collieries are worked in the district, and some of the largest tanneries in the kingdom are located here. Population, 1931, 487,789.

LEEK, an odd little plant which is native in the southern mountain ranges of Europe, but now found almost everywhere. The superstitious peasants of the continent used to plant leeks on the roofs of their cottages as a protection against lightning. The common leek is a biennial (which see), related to the onion, for both are members of the lily family (see color plate, in article LILY). It may grow to a height of three feet, but instead of possessing a bulb, like the onion, the lower part of the stalk is slightly thickened. The flavor is milder than that of the onion.

LEEUWENHOEK, *La'wen huk*, ANTHONY VAN (1632-1723), a Dutch naturalist and microscopist, with no pretense of being a trained scientist, who made invaluable contributions to the learning of his day. He began his active career by manufacturing microscopes, and his inquiring mind turned these toward exploration of the facts of natural science. He made clear the nature of red blood corpuscles, and proved the circulation of the blood in the capillaries. In the insect world he observed the reproductive processes in aphides, and proved false numerous suppositions regarding spontaneous generation among low forms of animal life. He opened the way for the scientific study of bacteria.

LEEWARD ISLANDS, a British colony including a number of the West Indies, divided into five administrative districts, namely, Antigua, Saint Christopher, Dominica, Montserrat and Anguilla. The area of the group is 715 square miles. The capital is St. John. Population, 1931, 127,900.

LE GALLIENNE, *le gal'ly en*, RICHARD (1866-), an English journalist, poet and critic, born in Liverpool, and educated at Liverpool College. He became literary critic for the *Star* in 1891 and was also associated with other papers. He first came into prominence in a religious controversy, which resulted in the publication of the *Religion of a Literary Man*, and he later attained notoriety by his attack on Rudyard Kipling's method and ability. In 1898 he

came to the United States on a lecture tour and later settled in New York. His works include several volumes of poems, and numerous essays and sketches on literature, travel and other topics. A daughter, Eva Le Gallienne, became an actress of note.

LEGAL TENDER. See TENDER.

LEG'ATE, a title borne by certain officials who represent the Pope outside of Rome. There are three classes of legates. The highest bear the title *legate a latere*, a dignity conferred now only on cardinals. The second class, called *nuncios*, or *legati missi*, have the same rank as ambassadors or ministers at the capitals of foreign countries. Then there are the *legati nati*, or "legates by virtue of their office." Certain archbishops bear this title. The United States does not recognize such officials; they are accredited only to Catholic countries.

LEGEND, *lej'end*, or *le'jend*, originally the title of a book containing the lessons that were to be read daily in the service of the early Church. The term was afterward applied to collections of biographies of saints and martyrs, or of remarkable stories relating to them. The modern legend is a tale which may or may not be susceptible of a basis of fact, but which the author does not allege to be so founded. Such a tale, and one of the best in any language, is Irving's *Legend of Sleepy Hollow*.

LEGERDEMAIN, *lejer de mane*, the art of performing deceptive tricks by skill of hand, sometimes aided by mechanical devices. Conjuring and magic are other names applied to the same art. The purpose of the performer is usually to portray something as operating contrary to the laws of nature, as the appearance or disappearance of an object without apparent cause, drawing yards of paper ribbon from some victim's nose, or silver dollars from his ears, etc. The success of the operation depends upon two things, the operator's skill of hand, and his ability to divert the attention of his audience. The changes are caused by substituting one object for another of identical appearance, as in the trick of placing a handkerchief in a box and taking out a guinea pig. The operator has two boxes exactly alike; the guinea pig is in one, and the other, as he shows his audience, is empty. He places the handkerchief in the empty box, then diverts the attention of his audience and instantly changes the boxes.

The trick is often done by changing from one hand to the other, and sometimes it may be accomplished through the operation of mechanical devices operated by an assistant.

Legerdemain, or sleight of hand, is still practiced by specialists who use their skill in giving public entertainments. It has no connection with the old ideas of witches or evil spirits, and in the sense in which it has been described is nothing more than a harmless form of amusement.

LEG'HORN, ITALY, a seaport on the Mediterranean, sixty-two miles west of Florence. It is the capital of the province of Leghorn, and is a modern and well-built city. Ranking next to Genoa and Naples among Italian ports, Leghorn is also known as a shipbuilding center and for the manufacture of the famous "Leghorn hats," made from wheat straw. Among its other exports are coral jewelry, wine, silk, olive oil and marble. It has many buildings of great architectural beauty, including a cathedral built in the seventeenth century, and a Jewish synagogue richly decorated with marbles. The public squares are adorned with imposing statues. Leghorn is also a favorite tourist resort because of its sulphur springs and sea bathing. Population, 1931 census, 124,391 (including suburbs).

LEGION, *le'jun*, in ancient Roman armies, a body of infantry, at different periods consisting of different numbers of men, from 3,000 to above 6,000, often with a complement of cavalry. Each legion was divided into ten cohorts, each cohort into three maniples, each manipule into two centuries. Every legion had sixty *centurions* and the same number of *optiones*, or lieutenants, and standard bearers. The standard of the legion was an eagle.

LEGION OF HONOR, a French order for the recognition of military and civil merit, instituted by Napoleon in 1802 and inaugurated in 1804. The order has been remodeled several times, the last time just after the downfall of the Second Empire. There are now five ranks or classes: ordinary chevaliers, or knights; officers, commanders, grand officers, grand crosses. The profuse granting of the decoration of the order latterly brought the institution into discredit and the number of chevaliers is now restricted to 25,000, the officers to 4,000, the commanders to 1,000, the grand officers to 200 and the grand crosses to seventy. The emblem is a

five-pointed star of white enamel which bears a figure emblematic of the Republic, with the inscription "*Republique Francaise*," and on the reverse, two flags, with the inscription, "*Honneur et Patrie*" (Honor and Country).

LEGISLATIVE ASSEMBLY, in Canada. In all the provinces except Quebec the law-making bodies in Canadian Provinces vary in form and method. The legislature is composed of one house, the legislative assembly. In Quebec, there is also an upper house, known as the legislative council, whose members are appointed by the lieutenant-governor. They may retain their position for life, unless they become bankrupt, are convicted of crime, or otherwise disqualified by law. The council of Quebec consists of twenty-four members; one of the members is chosen speaker by the lieutenant-governor. In Prince Edward Island the assembly is a combination of the former legislative council and of the assembly; since 1893, when the union took place, each district elects one member with a real estate qualification (\$3,250) and one member on the general franchise.

The legislative assemblies are elected by manhood suffrage, except Quebec, where a small property qualification is necessary. The method of election corresponds to that for Parliament: the lieutenant-governor, by the advice of his council, issues a proclamation dissolving the old legislature and appointing the day for the return of the writs; he also calls the new legislature together. The members receive a sessional allowance of \$400 in Prince Edward Island, \$800 in New Brunswick, \$1,000 in Nova Scotia, \$2,000 in Manitoba and Alberta, \$2,000 and extra mileage in British Columbia. \$2,000 in Ontario, and \$2,000 in Saskatchewan. The legislatures have a duration of four years (five in Quebec, Alberta, British Columbia and New Brunswick) unless dissolved by the lieutenant-governor, and they must meet each year. In Nova Scotia the legislative assembly is composed of forty-two members.

LEGISLATURE, *lej'is la ture*, that department of government which has the power to make, amend and repeal laws, subject, in some cases, to an organic law, or constitution, from which it receives its powers.

Legislatures of modern states, though varying widely in size and power, are agreed in essential principles. The legislature of a country, state or province usually consists of two houses, or chambers. In most states

one of these is composed of representatives of the people, chosen directly by the votes of citizens having certain qualifications, such as a certain age and, in some instances, conformity to educational and property requirements. This house generally possesses the sole power to initiate financial legislation and sometimes other legislation affecting the general interests of the people. The other house is representative of classes, as in England (the House of Lords), or of territorial divisions, as in the United States (the Senate).

There is a general agreement as to the rights and privileges of members of a legislative body during their terms of office, such as freedom from arrest, except for treason or other high crimes, and freedom of debate, subject only to the rules of the body. The tenure of legislators varies greatly. In some states, as in most European countries, members of the upper house serve for life or for long periods, or at the pleasure of the government of the division which they represent. The tenure of the members of the lower house of the legislature varies from one to seven years, though usually it is a short period. Members of the legislature are sometimes compensated, as in the United States, but frequently are not, as in Great Britain.

Among the states of the Union different names are given to the legislative body in the state government, though it is most frequently known merely as the *legislature*. In small units of government, as in the county, the legislative body is merged with the executive body in a board of supervisors, but in cities it is usually a separate body, known, generally, as the *common council* or *board of aldermen*.

For descriptions of various legislative bodies, see Congress of the United States; Parliament; Representatives, House of; Senate.

LEGUMINOUS, *le gu'min us*, **PLANTS**, or **PULSE FAMILY**, one of the largest and most important families of plants, including about 7,000 species, which are dispersed throughout the world. They are trees, shrubs or herbs, differing greatly in habit. The largest division is characterized by a flower, called *papilionaceous*, because of its resemblance to a butterfly; a good example is the sweet pea. The fruit is usually a pod, or legume, and from this the family takes its botanical name. The leaves are usually compound and sometimes are doubly so.

Wood, timber, medicine, dyes, foods and a great variety of substances used in domestic life are produced by this great family, and many species are highly ornamental in foliage or in flower. A great many of the plants of this order are described in their proper places; as, for instance, INDIGO; PEANUT; PEA; BEAN; CASSIA; ACACIA; CLOVER. For an illustration of typical plants belonging to this family see BOTANY, page 526.

LEHIGH, *le'hi*, **RIVER**, a river of Pennsylvania which rises near Wilkesbarre, flows southeast, then northeast and joins the Delaware at Easton. It has a course of about 120 miles, through a region of iron and coal, and is navigable for about eighty miles.

LEIBNITZ, *lip'e'nitz*, GOTTFRIED WILHELM, Baron von (1646-1716), a German scholar and philosopher, born at Leipzig. He studied law, mathematics and philosophy at the university of his native town, where he published a philosophical essay when only seventeen years of age. After holding political appointments under the elector of Mainz he went to Paris, where he applied himself particularly to mathematics. He also went to England, where he was elected a member of the Royal Society and made the acquaintance of Newton. About this time he made his discovery of the differential calculus (see CALCULUS). The Duke of Brunswick-Lüneburg then gave him the office of councilor, with a pension, and after a further stay in Paris he returned to Hanover and entered upon the superintendence of the library. Having assisted the elector of Brandenburg (afterward Frederic I of Prussia) to establish the Royal Academy of Sciences at Berlin, he was made president for life. His writings included mathematics, science, philosophy and religious topics.

LEICESTER, *les'tur*, **ENGLAND**, the county town of Leicestershire, on the Soar River, 100 miles nearly north of London. It is a place of considerable antiquity and was known to the Romans under the name of Ratae. Its walls and strong castle were demolished in the reign of Henry II. It suffered severely during the wars of Lancaster and York and also during the Civil War of 1642. Its manufactures consist of boots and shoes, hosiery, laces, thread and iron ware. The city owns all its public utilities, including abattoirs, baths, technical schools and sewage farms, in addition to light, water and traction lines. Population, 1931, 239,111.

LEICESTER, ROBERT DUDLEY, Earl of (about 1532-1588), an English courtier, a favorite of Queen Elizabeth. In 1550 he was married to Amy Robsart, daughter of a Devonshire gentleman, and is said to have been accessory to her murder in 1560. Elizabeth created him Earl of Leicester and privy councilor and lavishly bestowed titles and estates on him, her fondness for him causing his marriage with her to be regarded for a time as certain. So great was the opposition that Elizabeth was obliged to renounce any intention she may have had of marrying him; but his marriage with the Countess of Essex in 1578 deeply offended her. *Kenilworth*, by Sir Walter Scott, gives the story of Amy Robsart.

LEIDY, *W'dy*, JOSEPH (1823-1891), an American naturalist who made valuable contributions to the natural sciences. He was born in Philadelphia and received his education at the University of Pennsylvania. In 1846 he was made chairman of the board of curators of the Academy of Natural Sciences and also filled a position as demonstrator of anatomy in the University of Pennsylvania. Later he was made professor of anatomy in the medical school of the same university, and in 1853 he became professor of biology in the faculty of philosophy. He was elected president of the Academy of Natural Science at Philadelphia in 1881, and four years later became president of the Wagner Free Institute of Science. Leidy's works include *A Flora and Fauna Within Living Animals*, *Cretaceous Reptiles of the United States*, *The Extinct Mammalia Fauna of Dakota and Nebraska* and *Treatise of Human Anatomy*.

LEIF, *life*, **ERICSON**. See ERIC THE RED.

LEIGHTON, *la'ton*, FREDERICK, Lord (1830-1896), an English painter, born at Scarborough. When twenty-five years of age he sent to the Academy his picture of *Cimabue's Madonna Carried in Triumph through Florence*, which called forth general admiration. For the next four years Leighton lived in Paris, then took up his residence in London. In 1869 he was elected a Royal Academician, and in 1878 he became president of the Academy, was knighted and was named an officer of the Legion of Honor. In addition to his painting, he gained a high place as a sculptor by his *Athlete Strangling a Python* and his *Sluggard*. The special merit of his work lies in the perfection of his

drawing and design, as well as in refinement in execution. Among his many works may be mentioned his *Hercules Wrestling with Death*, *The Bath of Psyche*, *The Music Lesson*, *Lachrymae*, *Cymon and Iphigenia*, *Captive Andromache* and *Ball Players*. The large frescoes at South Kensington Museum, representing the *Industrial Arts Applied to War* and the *Arts of Peace*, are also by him.

LEIPZIG, *lipe'tsiK*, or **LEIPSIC**, *lipe'siK*, GERMANY, the largest city of Saxony and the third in size in the country, is situated on the Elster, Pleisse and Parthe rivers, sixty miles nearly west of Dresden. The market place in the old town has a picturesque appearance, having about it the old townhall (Rathaus) and other buildings in the Renaissance style.

The Augustusplatz is one of the finest squares in Germany and contains the university, the museum, the theater and the post office. The Pleissenburg, or castle, now used in part as a barrack, withstood the attacks of Tilly and is memorable as the scene of the famous disputation between Luther and Doctor Eck. The suburbs contain the Church of Saint John, the Church of Saint Peter and the Roman Catholic church, the Rosenthal (Valley of Roses), with pleasant wooded walks, and numerous places of recreation. The university, founded in 1409, is the third in importance in Germany and before the World War had almost 4,000 students and a library of about 500,000 volumes. Schools are numerous and good, and there is a famous conservatory of music. Besides being the center of the book and publishing trade of Germany and world famous for its color printing, the city possesses many great factories, and has important general commerce.

Leipzig early received the Reformation. In 1631 Gustavus Adolphus defeated Tilly near it, at Breitenfeld. It suffered much from the Seven Years' War. In October, 1813, the great "Battle of the Nations" was fought around and in Leipzig (see LEIPZIG, BATTLES OF). Population, 1922, with suburbs, 636,503; 1933, 713,470.

LEIPZIG, BATTLES OF. Two important battles were fought near Leipzig during the Thirty Years' War, and one during the war against Napoleon. The first was in September, 1631, and resulted in the defeat of the imperial army, under Tilly, by the Protestants, under Gustavus Adolphus. This was the first great victory which the Protestants

had won. The second battle took place in November, 1642, and was also between the Swedes and the imperialists. The imperialists were again defeated. See THIRTY YEARS' WAR.

In October, 1813, a great battle was fought at Leipzig between Napoleon and the Austrians, Prussians, Russians and Swedes. This battle, known as the "Battle of the Nations," resulted in a complete defeat for Napoleon.

LELAND STANFORD JUNIOR UNIVERSITY, or **STANFORD UNIVERSITY**, an institution of higher learning located at Palo Alto, Calif., thirty miles south of San Francisco. It was founded by Leland Stanford and his wife in memory of their only child, Leland Stanford, Jr., who died in 1884. The university was opened to students in 1890. To the original endowment of 9,000 acres of land Mr. Stanford added \$2,500,000 by his will, and after his death Mrs. Stanford deeded to the institution most of the remainder of the estate. The income-producing endowment is \$31,500,000.

The university includes the schools of education, engineering, hygiene and physical education, law, letters, medicine, physical sciences, social sciences, the graduate school of business, the Hopkins Marine Station for biological research, and the Food Research Institute.

The responsibility for the government of the students and for maintaining university standards rests with the men and women of the university. They assist largely in administering the honor code which was adopted in 1921. Independent study under a faculty advisor is permitted.

The usual class divisions are not recognized, and students graduate whenever they have completed the work required for the degree for which they are studying, regardless of the amount of time spent at the university. The buildings are patterned after the old California missions and are arranged around two quadrangles. The material used is gray stone, with red tile for roofing. This combination, together with the arrangement of the buildings, makes Leland Stanford one of the most attractive universities in the country. The beautiful memorial chapel was destroyed and a number of the other buildings were badly damaged by the earthquake which occurred April 18, 1906, but the buildings were replaced at once. The enrollment

of students averages nearly 4,000; the faculty numbers about 426. There are nearly 600,000 volumes in the library.

LEMBERG, *lem'berK*, **POLAND**, (in Polish, Lwow) before the World War the fourth city in population among the cities of Austria-Hungary. It was the capital of the crownland of Galicia, and the seat of the third largest university in Austria. Lemberg is situated 365 miles northeast of Vienna, on the Peltew River. Before the war it was industrially and commercially the chief city of Austrian Poland, with prosperous manufactories of farm machinery, boilers, musical instruments, malt liquors, flour and other products, and it had a thriving trade in flax, hemp, wool and linen.

During the war and afterwards Lemberg suffered greatly. It was captured by the Russians in 1914, and retaken in 1915 by the Austro-German forces, both armies causing great material damage through bombardment. Even after the armistice was signed, in November, 1918, warfare against the city continued, for it was bombarded again and again by the Ukrainians, who sought to capture it. The city water system and the lighting and electric car plants were made useless, and the people suffered correspondingly. Population, 1931, 316,177. See **WORLD WAR**; **GALICIA**.

LEM'MING, a burrowing animal much like the rat. There are several species, found in Norway, Lapland, Siberia and the northern parts of America. The best-known species is the *common*, or *European lemming*, whose body color is brownish, variegated with black, while the sides of the head and belly are white or of a grayish tint. The legs and tail are gray. The lemming feeds on plants and is exceedingly destructive to vegetables and crops. Vast hordes, at intervals ranging from five to twenty-five years, migrate toward the Atlantic and the Gulf of Bothnia, destroying vegetation in their path. Bears, wolves and foxes make them their prey while they are migrating, and many also die from hunger and exposure. It is a curious fact that when they reach the sea they jump in by thousands and die by drowning. One species, called the *banded lemming*, is found in the Hudson Bay region of North America. Like some other fur-bearing animals inhabiting cold countries, it turns white in winter.

LE MOINE, *le muahn'*, **JAMES MACPHERSON**, Sir (1825-1912), a Canadian author and

naturalist. He was born in Quebec and received his education at Le Petit Séminaire de Quebec. In 1850 he was admitted to the bar. His first public position was collector of inland revenue at Quebec, and later he became inspector. Much of his time was spent in the study of natural history, especially the study of birds, and he made many careful researches and investigations. He was the author of *The Ornithology of Canada*, *Legendary Lore of the Lower Saint Lawrence*, *Maple Leaves* and *Quebec, Past and Present*.

LEMON, a widely-used citrus fruit, closely resembling the orange in structure. It grows on a tree found originally in India, and now cultivated extensively in Southern Europe, California, Florida and Mexico as well as in other tropical lands. The yearly output of California and Florida is about 2,770,000 boxes, California producing the greater part of this yield. The lemon tree reaches a height of from ten to twenty feet, and bears pale-green, oval leaves and small flowers of a purplish color on the outside.

Trees begin to bear fruit the third or fourth year, but do not produce fully until the sixth or seventh year. The oblong, yellow fruits ripen in winter, but since the lemon is in greatest demand during the summer, the ripened fruit is preserved under cold storage. The fruit does not ripen well on the tree; hence it is picked green and allowed to mature slowly in a darkened room. The sour juice of the lemon is extensively used as a flavoring and in making cooling beverages. It is also of value in calico printing and in the manufacture of citric acid. Lemon extract, common in cookery, is made by expressing oil from the peel.

LE'MUR, the name applied to a family of animals between the monkeys and the apes. There are about fifty species, all of which live in Africa or Madagascar and neighboring islands. The fur is soft and delicate and usually of a light color, and the tail is long. Lemurs vary from the size of a cat to that of a mouse. The *ring-tailed lemur*, a species which lives on cliffs and along the sea, is gray in color, with black and white rings about its tail. The *ruffed lemur* is about the largest of the lemurs; the *mouse lemur* is about the size of a rat. The *avahis* is about a foot long, with a tail three inches longer; it lives a solitary life and appears only at night. The *indris* is of a black color, with white upon the rump and limbs. The natives

of Madagascar call this lemur the *dog of the forest*, because its howls resemble those of a dog.

Lemurs are harmless little creatures and are easily tamed, but the peculiar appearance



LEMUR

of the face, their large eyes and their habit of feeding at night made them objects of superstition and awe, and gave them the name lemur, which means ghost.

LENA, a river of Siberia. It rises west of Lake Baikal, flows northeasterly, then northwesterly and enters the Arctic Ocean through several mouths. It forms a delta 250 miles wide. Its total length is 2,700 miles. Its chief tributaries are the Aldan, the Olekma, the Vitim and the Vilyui. Eight hundred miles from the ocean the Lena attains a width of five or six miles, and it is generally navigable during the open season. It is free from ice between Yakutsk and Kirensk from the middle of May to the middle of November, and during this season it is navigable for steamers between these points. The Lena is one of the largest rivers of Asia and the largest within the boundaries of Siberia. It drains an area of about a million square miles.

LENGTH OF LIFE. See **LONGEVITY**.

LENIN, NIKOLAI (1870-1924), a Russian revolutionist and agitator, one of the most prominent leaders of the Bolshevik movement which overthrew the Kerensky provisional government in Russia, in November, 1917. He was born of a noble family, at Simbirsk, on the Volga. Lenin is an assumed name; his real name was VLADIMIR ILITCH ULYANOFF. Lenin came into public notice soon after 1890, when he became leader of the radical Socialist party. Though elected to the Duma after the revolution of 1905, he was subsequently expelled, and when the World War broke out he was living in Cracow, Galicia. He was permitted by the Austrian government to go to Switzerland, where he remained until the Russian revolution. Under an agreement between the German government and provisional Russian government, he was unfortunately allowed to return to Russia, and he reached Petrograd in May, 1917. Lenin began at once to agitate immediate peace, and in July he attempted to overthrow the government. The effort was unsuccessful, and he was obliged to go into hiding for a time, but eventually his theories gained such ground that a new régime supplanted the moderate Socialist government in November, 1917. Leon Trotzky was his able assistant.

On November 9 the All-Russian Congress of Workmen's and Soldiers' Delegates named a provisional Cabinet, with Lenin at its head. In February, 1918, Russia formally withdrew from the war. With utmost vigor Lenin forced bolshevism upon Russia until the country in gravest peril, he sought the aid of other nations in 1921 to avert destruction. Later he was willing to return to capitalism, to a limited extent. See **BOLSHEVIKI**; **RUSSIA**; **WORLD WAR**.

LENINGRAD, the name given by the Soviet Government of Russia in 1924 to the city of Petrograd (formerly St. Petersburg).

LENNI-LENAPÉ, *len'ne le nah'pay*. See **DELAWARE** (Indians).

LEN'OX, JAMES (1800-1880), an American philanthropist, born in New York City. He was educated at Columbia College and was admitted to the bar. Having inherited from his father several millions of dollars, for half a century he devoted himself to the forming of a library and gallery of paintings. This he conveyed to New York City in 1870, having erected a beautiful structure to receive it. He was a liberal donor to many

churches and societies. In 1895 his library was consolidated with the Astor Library and the Tilden Trust to form the present public library of New York City.

LENS, *lens*, a transparent body having at least one curved surface. Glass lenses are used in spectacles, field glasses and all other kinds of optical instruments, and it is therefore important to know the various forms.

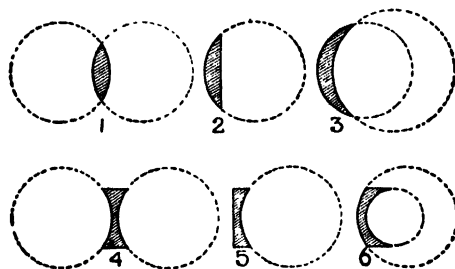


FIG. 1

Lenses have either one plane and one spherical surface, or two spherical surfaces. If the surface curves outward, the lens is *convex*; if inward, it is *concave*. There are six kinds, as shown in Fig. 1.

1. Double-convex lens; both surface convex.
2. Plano-convex lens; one surface convex and one plane.
3. Concavo-convex lens; one surface convex and one concave.
4. Double concave lens; both surfaces concave.
5. Plano-concave lens; one surface plane and one concave.
6. Convexo-concave lens; one surface concave and one convex.

Lenses refract rays of light which pass through them. If the lens is convex, the refraction tends to bring the rays to a point, called the *focus*, as shown in Fig. 2.

The parallel rays, 1, 2, 3, 4 and 5, passing through the double-convex lens *LM*, come to a point at *F*, which is the focus. When the rays of the sun are collected in this way by a double-convex lens, they afford sufficient heat to set such substances as tinder, paper and dry pine wood afire. For this reason, such a lens is sometimes called a *burning glass*.

Convex lenses form two kinds of images. When the object is at a long distance from the lens, the image formed is smaller than the

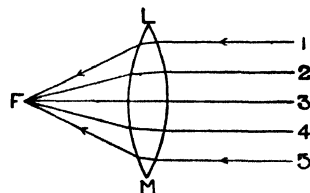


FIG. 2

object, and inverted, as shown in Fig. 3. AB represents the object. The parallel rays from A and B strike the lens respectively at a and b . Aa is refracted to A' and Bb to B' . The rays AA' and BB' strike the lens vertically and pass through its center; consequently they are not refracted. A screen

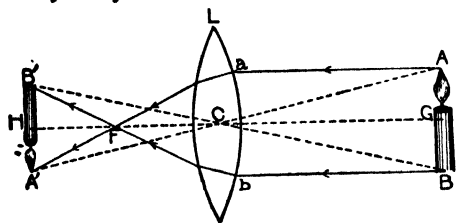


FIG. 3

placed at the point where these rays meet the refracted parallel rays will receive the image. If the screen is moved either backward or forward from this point, some of the rays are lost and the image becomes indistinct.

When the object is between the focus and the lens, the image is erect and magnified. In Fig. 4, AB is the object and $A'B'$, the image. The parallel rays from A and B are refracted and meet at F , while the rays AA' and BB' pass through the center of the lens and are not refracted. The image appears where these rays meet the refracted parallel rays. In this case both the object and the image are on the same side of the lens, while in the former the image is on the other side of the lens from the object. Fig. 4 illustrates the use of the convex lens as a simple magnifying glass. The images formed by concave lenses are erect and smaller than the object.

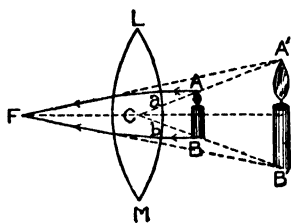


FIG. 4

Related Articles. Consult the following titles for additional information:
 Aberration Microscope
 Camera Opera Glass
 Eye Telescope

LENS, *lahn*, FRANCE, an industrial town in the center of one of the most valuable coal fields of France. Before the World War it had a population exceeding 40,000, but the city was on the line of defense during the four years of conflict, and it was literally pounded into ruins. Its extremely produc-

tive coal mines were exploited by the Germans, and when eventually they were given back, the mines were flooded. Reconstruction proceeded as rapidly as possible, but the former prestige of the city has not been regained, and it suffered the loss of a fourth of its people. Coal mining has been resumed, and many factories have been rebuilt. Iron and steel products are manufactured, and there is considerable production of beet-sugar, wire rope and soap. Population, 1931, 30,099. Before the war it had 40,000 people.

LENT, the forty days' fast in spring, beginning with Ash Wednesday and ending with Easter Sunday, celebrated by Christian churches. In the Latin Church Lent formerly lasted thirty-six days, but in the fifth century four days were added, in imitation of the forty days' fast of the Saviour, and this usage became general in the Western Church. Its close is celebrated in Roman Catholic countries with great rejoicings. The English Church has retained Lent and many other fasts, but gives no directions respecting abstinence from food, as does the Roman Catholic Church. The forty days of Lent do not include Sundays. Palm Sunday is the last Sunday in Lent.

LENTIL, the seed of a plant that resembles the pea vine. Lentils are flattish, rounded and, when cooked, reddish in color. They are more easily digested than peas, are very nutritious and are an important article of diet in Egypt, Syria and other Mediterranean countries. Lentils are also seen in the markets of the United States, but these are imported. According to tradition the pottage for which Esau sold his birthright was a dish of lentils. See BIBLE, subhead *Bible Stories*.

LE'O (the lion), a bright and interesting constellation, containing ninety-five stars, noteworthy because of its remarkable nebulae. Leo is the fifth sign of the zodiac, between Cancer and Virgo, and is entered by the sun about July 22. In ancient astrology the symbol (Ω) was the breastbone or the tail of a lion.

LEO, the name of thirteen Popes, of whom the following were the most important:

Leo I, Saint, Pope from 440 to 461, was a very able ruler and strengthened the power of the Papacy. When Attila took Rome in 452, Leo visited the conqueror in person and induced him to spare the city, and three years later, when Genseric attacked the city, by his interposition he saved many of the most beautiful buildings of the city.

Leo III, who became Pope in 795, was the Pope who crowned Charlemagne emperor of the West.

Leo IX, Pope from 1048 to 1054, was a learned man and devoted much attention to the correction of abuses within the Church. He firmly upheld the power and rights of the Church and thus prepared the way for the later struggle over prerogatives between the Popes and the emperors.

Leo X, Giovanni de Medici, was the son of Lorenzo the Magnificent and became Pope in 1513. His court was splendid and, like the other members of his family, he was a munificent patron of learning and art. The University of Rome was reorganized by him. It was during his reign that the Reformation broke out in Germany. At first Leo refused to take the new movement seriously, but in 1520 he went so far as to proclaim a bill of excommunication against Luther.

Leo XIII, (1810-1903) was born at Capriente, Italy. He became titular archbishop in 1843, was apostolic delegate, successively, of Benevento, Spoleto and Perugia, and was bishop of Perugia in 1846. He was raised to the rank of cardinal in 1853 and appointed chamberlain of the Sacred College in 1877; the Conclave of Cardinals elected him successor to Pius IX in 1878. The new Pope at once made known his election to the powers, and his first official act, March, 1878, was to restore the Roman Catholic hierarchy of Scotland, thus inaugurating a policy somewhat different from that of his predecessor. In 1879 he issued an encyclical aimed at Socialists, Communists and Nihilists. The Czar



LEO XIII

ordered this to be read in all the Roman Catholic churches of Russia. The policy of Leo XIII was to harmonize the diversified opinions and interests of the Church and to strengthen all lines of work which it is authorized to undertake. He was very friendly to the United States; he established the Catholic University at Washington, and expressed great interest in the Columbian Exposition. Leo was noted for his learning, holiness and statesmanlike qualities.

LEOMINSTER, *lem'in stur*, MASS., in Worcester County, five miles southeast of Fitchburg, on the Nashua River and on the New York, New Haven & Hartford and the Boston & Maine railroads. The principal manufactures are carriages, celluloid and leather articles, toys, furniture, paper, cement and brick. There is a Carnegie Library and a hospital. The place was settled in 1725, and remained a part of Lan-

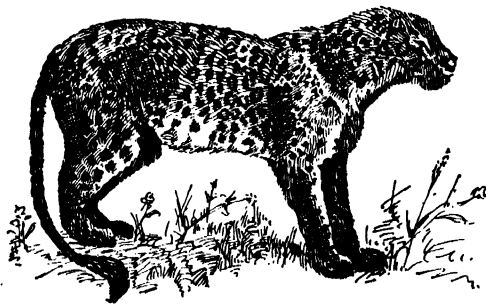
caster until 1740. Population, 1920, 19,745; in 1930, 21,810.

LEON, *la own'*, NICARAGUA, founded in 1523, is the second city of the country, situated on a fertile plain thirteen miles from the Pacific coast. It is regularly built, and the public buildings, which are considered among the finest in Central America, include a massive cathedral, an old episcopal palace, a new episcopal palace and a university. A railway connects it with Lake Nicaragua at Granada. Population, 1932, 23,565.

LEONARDO DA VINCI, *la o nahr'doh dah veen'che*. See VINCI, LEONARDO DA.

LEONIDAS, a king of Sparta, who ascended the throne in 491 B. C. When Xerxes invaded Greece, the Greek congress assigned to Leonidas the command of the force destined to defend the pass of Thermopylae. His force, according to Herodotus, amounted to over 6,000 men, of whom 300 were Spartans. After the Persians had made several vain attempts to force the pass, a Greek named Ephialtes betrayed to them a mountain path, by which Leonidas was assailed from the rear, and he and his followers fell fighting (480 B. C.).

LEOPARD, *lep'urd*, one of the largest animals of the cat family, next in size to the lion and the tiger, but more treacherous than even the latter. It is found in Africa, Persia, India, some parts of China and some of the East India islands. The color varies



THE LEOPARD

from a pale fawn to a deep buff, which fades into white on the under side of the body and the inner parts of the limbs. The coat is thickly marked with black or deep brown spots. It is a beautiful and graceful animal, and its home is usually in forests. It feeds on antelopes, monkeys, sheep, goats and other small animals, but seldom attacks man. While it is easily subdued when in captivity, great risk and danger attend hunting it. One

variety is nearly black and is more fierce than the common leopard. The *chetah*, or *hunting leopard*, is found in Northern India.

LEOPOLD II, LOUIS PHILIPPE MARIE VICTOR (1835–1909), king of the Belgians, eldest son of Leopold I, ascended the throne in 1865. The organization of the African International Association was his work, and he assisted Stanley with money in his exploration of the Congo. When the Congo Free State was established in 1885, Leopold was made its sovereign. He exploited the African natives in such a cruel manner in his rubber operations that an international protest was launched against his practices. He was profligate in many of his relations, and died without leaving an heir to the throne. Albert I, a worthy nephew, who became the Belgian hero in the World War, succeeded him.

LEOPOLD III (1901–), King of the Belgians, succeeded his father, Albert I (which see), in February, 1934, at the age of thirty-three. He inherited his father's sincere love of democracy, like him became a thorough student of government, and well-informed on the serious problems confronting his country. In 1926 Leopold married Princess Astrid of Sweden, thus forming a strong bond between the two countries. Two children were born, the younger becoming Crown Prince Baudoin on the accession of his father; the older child is Princess Josephine Charlotte. Queen Astrid was killed in a motor accident in Switzerland in 1935.

LEPIDOPTERA. See INSECTS.

LEPIDUS, MARCUS AEMILIUS (?–13 B. C.), a Roman triumvir. He was praetor in 49 B. C., consul with Julius Caesar three years later and in 44 was appointed by Caesar to the government of Nearer Spain. He was in Rome at the time of Caesar's death and joined Mark Antony. In 43 he united with Antony and Octavianus to form the second triumvirate, obtaining Spain in the division of the Empire. After the Battle of Philippi (42) a revision of the allotment took place, in which Lepidus received Africa. In 36 he was summoned to assist Augustus against Sextus Pompey. He then tried to seize Sicily, but was overcome by Augustus, who forced him to retire to private life.

LEPROSY, a skin disease which from earliest times has inspired more fear than almost any other affliction of mankind. Yet in highly-civilized countries leprosy is very rare, and its death rate is far below that

of tuberculosis, cancer or pneumonia. The hideous deformities caused by leprosy, and the fact that the victim of the disease, unless relieved by treatment, drags out a miserable existence covering years, are responsible for the horror which the name incites.

Leprosy is caused by a bacillus which was first identified by a Norwegian named Gerhard Hansen. According to many authorities there are three main forms, namely, *macular*, *anesthetic* and *tubercular*. Some cases show all three forms. In macular leprosy dark red or black stains appear on the skin. In anesthetic cases the patient experiences the loss of feeling in the sections of tissue that are diseased. In the tubercular form the affected tissue becomes a mass of small, grain-like elevations. In well-developed cases there are ulcerations in various parts of the body, causing affected areas to drop off. Sometimes even the bones are destroyed. Leprosy is spread by personal contact, and it requires from two to seven years for a case to develop.

Of the various remedies that have been used, the most effective is chaulmoogra oil. Because of the nauseating effects of this drug, it is given most satisfactorily as a hypodermic injection. In the leper colony at Culion, Philippine Islands, the oil is mixed with camphorated olive oil and resorcin. In India a newer remedy than chaulmoogra oil, called sodium hydrocarbate, is successfully employed.

The Culion colony in the Philippines is one of the most famous in the world; another equally important is that on the island of Molokai, in the Hawaiian group. In the United States the Federal government maintains a colony at Carville, Louisiana, near New Orleans, one of the world's best equipped centers for combatting the disease.

There are known to be more than two million cases of leprosy in the world today, the majority occurring in tropical Asia and Africa. Medical science having found means to combat the malady, in time it may be stamped out; the success of the treatment employed gives this hope for the future.

LES MISERABLES, *leh me za rah'bl'*, a celebrated novel by Victor Hugo, first published in 1862. The title, which means *The Miserable People*, suggests the character of this fascinating story, which has been justly called a "prose epic" of the human soul.

The central character, Jean Valjean, becomes a criminal because of unjust treatment, but experiences a transformation of character through the influence of the good Bishop Bienvenu. Thereafter his own life is one of self-sacrifice and devotion to ideals. Throughout the story, with its complex plot, matchless descriptions and vivid pictures of all classes of life, there is the background of the unhappy lot of the poor and downtrodden. *Les Misérables* has been dramatized for the regular stage, but was much more successful when presented through the medium of moving pictures.

LESSEPS, FERDINAND, Vicomte de (1805-1894), a French diplomat and engineer, the builder of the Suez Canal. After holding consular positions at Lisbon and Tunis, he was assigned to Alexandria, Egypt, in 1832, and in 1833-1837 was consul at Cairo. At that time he gave considerable thought to the feasibility of a canal across the Isthmus of Suez, connecting the Red and the Mediterranean seas, but nothing came of the idea for many years. In 1854, after he had retired from government service, he returned to Egypt to discuss the project with Said Pasha. The latter gave the necessary authorization, and De Lesseps proceeded to organize a company to finance the undertaking. Work began in 1859 and the canal was completed in 1869, being opened with appropriate ceremonies on November 9 (see SUEZ CANAL). Ten years later, De Lesseps was authorized to organize a company to construct a canal across the Isthmus of Panama. Misfortune beset the enterprise, and in 1888 the company went into bankruptcy.

LESSER ANTILLES, *an til leez*. See ANTILLES.

LETHBRIDGE, ALBERTA, on the Belly River and the Canadian Pacific and Great Northern railways, 109 miles from Medicine Hat. It is an important railway center, is the shipping point for a rich coal-mining and farming region, and has natural gas. Over 40,000,000 bushels of wheat are produced in the vicinity, and there is an extensive wool industry. Within sight of the city are several large coal mines. The head office of the Canadian Pacific, Lethbridge Section, is located here. The chief industries of the city include iron and brick works, flour and woolen mills. The city is the headquarters of the Southern Alberta division of the Royal Canadian Mounted Police, and has a land

office, a district court, customs house, a Dominion experimental farm, and stock yards. The altitude of the city is 2,950 feet above sea level. Population, 1931, 13,489.

LE'THE, one of the streams of the lower regions, celebrated in ancient mythology. Its water had the power of making those who drank of it forget the whole of their former existence. Souls before passing into Elysium drank to forget their earthly sorrows; souls returning to the upper world drank to forget the pleasures of Elysium. The word is from the Greek for *forgetfulness*.

LETTER OF CREDIT, an order given by bankers or others at one place, to enable a person to receive money from their agents at another place. It differs from the common *check* or *draft*, in containing a statement, not of the exact amount to be paid, but of an amount which the payment shall not exceed. It may contain coupons, each of which calls for a certain amount. If it names several banks which shall honor drafts, it is known as a *circular letter of credit*, and in this form it is much used by travelers.

LETTER WRITING, a form of composition that is practiced by all civilized people beyond the period of childhood. The demands of friendship, of social intercourse and of business make letter writing one of those tasks that fall practically to everyone, and a knowledge of how to perform this duty acceptably is very important. Like all forms of written composition, letters should be expressed in correct English, and the details of punctuation, spelling and paragraphing should have careful attention.

The Form of a Letter. There are certain rules of form which all persons who follow convention will observe in writing a letter. That is, the conventional letter will consist of the following parts: the heading, the introduction, the body of the letter, the close and the superscription. The heading, which is placed at the top of the first sheet, on the right-hand side, consists of the address of the writer and the date of writing. It may occupy two or three lines, but if three lines are used the first should consist of the street and number, the second of the town and state, and the third of the date.

The introduction includes the address of the person or firm that is to receive the letter, and a salutation, such as *Dear Madam*, *My Dear Mr. Jones*, *Dear Alice*. The body of the letter, which is by far the most important

part, contains what the writer has to say to the person addressed. Whether a person is writing informally to a dear friend, formally to acknowledge a dinner invitation, or in a businesslike way to apply for a position, he should strive to make the letter attractive in appearance and in subject-matter. The complimentary close has a wide variety of forms, and may be affectionate, conventional, brief, or cordial.

The superscription, which is placed on the envelope, should be a duplicate of the address in the introduction. Sometimes, however, additional directions are necessary, as when a letter is to be forwarded, or sent in care of another person. The following is an acceptable form:

Mr. Thomas Carhart,
1120 Pine Avenue,
Cleveland, Ohio.

To insure return of the letter if the person addressed cannot be found, the writer should place his own name and address in the left-hand upper corner of the envelope.

The following form indicates the make-up of a typical letter:

(Heading)

106 S. Hope Street,
Los Angeles, Cal., May 8, 1947.

(Introduction)

Mr. John Gordon,
18 Larch Avenue,
Chicago, Ill.

(Salutation)

My dear Mr. Gordon:

(Body of letter).....

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.....

.....

(Complimentary Close)

(Complimentary Close)

Cordially yours,

AMOS P. HENDERSON.

Formal Notes. These are written in the third person and are not signed. The following are acceptable forms:

An Invitation.

Miss Genevieve Grant requests the pleasure of Mr. Hartmann's company at a bridge party on the evening of March eighth, at eight o'clock.

March first,
29 St. John Street.

An Acceptance.

Mr. Hartmann accepts with pleasure Miss

Grant's kind invitation for March eighth at eight o'clock.

March third,
110 S. Carr Avenue.

A Declination.

Mr. Hartmann regrets that he is unable to accept Miss Grant's kind invitation for March eighth, because he will be out of the city on that date.

March third,
110 S. Carr Avenue.

LETTS, a branch of the Aryan family, belonging to the Letto-Lithuanian group. These people live in the Russian provinces of Courland, Livonia, Vitebsk, Kovno and Pskov and in East Prussia. They are closely related to the Lithuanians, whom they resemble in appearance. They number about 2,000,000, and are mostly Protestants.

LETTUCE, *let'tis*, a common garden plant of the composite family, eaten raw with vinegar and sugar or salad dressing. When allowed to grow to maturity it produces a stem which grows to a height of about two feet and bears small, pale yellow flowers. In cultivation the young plant only is eaten, as it becomes bitter and even somewhat poisonous when old. Several different species are recognized; one garden variety produces a head much like a small cabbage. Another common variety is called *leaf* lettuce. It has long, smooth leaves, while those of *head* lettuce are somewhat crinkled. Only one-twelfth part of lettuce has food value, but it adds variety to the meal, and makes an attractive and refreshing addition to sandwiches and various kinds of salad.

LEUTZE, *loit'se*, EMANUEL (1816-1868), a German-American painter, born in Gemünd, Württemberg. At an early age he came with his parents to Philadelphia, where his first instruction in art was received. Later he went to Düsseldorf to study with Lessing. The finest of his productions is a series of pictures of the Revolution, among which is *Washington Crossing the Delaware*. His subjects, more than the quality of his drawings, have made him famous. Other works are *Columbus in Chains*, *Columbus Before the Queen*, *Cromwell and His Daughter*, *Washington at Monmouth*, *News from Lexington* and *Westward Ho*.

LEVANT', a word liberally interpreted to mean *toward the sunrise*, refers in the widest sense to all the regions eastward from Italy as far as the Euphrates and the Nile, but in a more restricted sense to the Asiatic coasts

of the Mediterranean and the adjacent countries of Asia Minor.

LEV'EE, in engineering, an artificial embankment constructed on the banks of a river for the purpose of keeping the waters in the natural channel during floods. According to this definition the dikes of Holland and the embankments along a number of European rivers, such as the Danube, Po and Vistula, are levees. In the United States, however, the term is applied particularly to the artificial embankments along the Mississippi River, which aggregate more than 1,500 miles in length and are constructed along the river at various places from Cairo to the Gulf of Mexico.

The first levees were built after severe floods in 1882. Between that date and 1927, when the most disastrous of all floods occurred, the government and the states along the lower river spent about \$60,000,000 on new levees. Since 1927 the government has worked constantly on the problem of flood control.

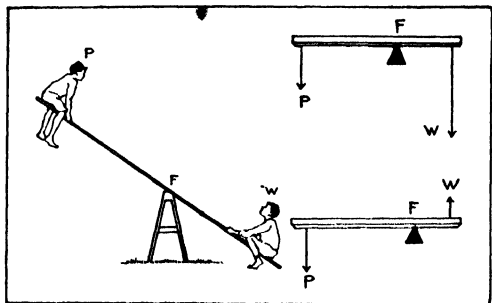
LEV'EL, an instrument used to find, or draw, a straight line parallel to the plane of the horizon. By this means is determined the true level or the difference of ascent or descent between several places. There is a great variety of instruments for this purpose, differently constructed and of different materials, according to the particular purposes to which they are applied, as carpenter's level, mason's level, gunner's level, balance level, water level, mercurial level, spirit level and surveying level. All such instruments, however, may be reduced to three classes:

- (1) Those in which the vertical line is determined by a suspended plumb line, or balance weight, and the horizontal indicated by a line perpendicular to it. Such are the carpenter's and mason's levels.
- (2) Those which determine a horizontal line by the surface of a fluid at rest, as water and mercurial levels.
- (3) Those which point out the direction of a horizontal line by a bubble of air floating in a fluid contained in a glass tube. When the air bubble rests directly under the middle point of the tube, the instrument is level. Such are spirit levels, which are by far the most convenient and accurate. All levels depend on the same principle, namely, the action of gravity.

LEVER, *le'ver*, or *lev'er*, one of the simplest of devices for accomplishing work. It may consist merely of a solid bar, such as a crowbar, resting upon a rock or block of

wood, as a fulcrum. In performing work a third object, a weight, is introduced. Thus in manipulating a lever three elements are present, namely, *power*, *weight* and *fulcrum*. The parts of the lever on each side of the fulcrum are called the *arms*. The power arm is the part between the fulcrum and the point where the power is applied; the weight arm is that part between the fulcrum and the weight.

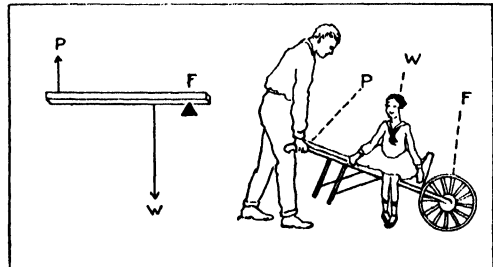
Three Classes of Levers. The principle of the lever has a wide variation in mechanics. There are three classes of levers, distinguished by the different applications of the fulcrum, power and weight.



LEVER OF THE FIRST CLASS

The lever of the first class has the fulcrum between the power and the weight, as shown in the first figure. *F* represents the fulcrum, *P* the power and *W* the weight. A common crowbar, a pump handle, a pair of scissors and a boy's seesaw are good illustrations of levers of the first class.

The lever of the second class has the weight between the power and the fulcrum, as shown in the second illustration. A nutcracker and

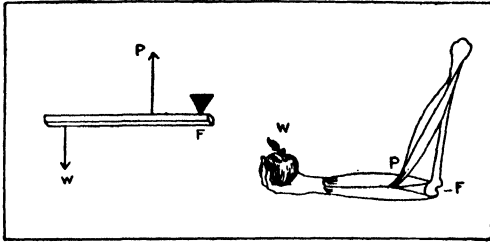


LEVER OF THE SECOND CLASS

a wheelbarrow are good illustrations of this class of levers.

The lever of the third class has the power between the weight and the fulcrum, as

shown in the third figure. Good illustrations of the third class lever are the treadle of the



LEVER OF THE THIRD CLASS

sewing machine and the forearm. See MECHANICAL POWERS.

A lever is said to be in *equilibrium* when the power and the weight balance each other. The law of equilibrium is that the power multiplied by the length of the power arm is equal to the weight multiplied by the length of the weight arm. In a lever of the first class which is three feet long and has a fulcrum one foot from one end, a power of one pound would balance a weight of two pounds. In levers of the third class the positions of the power and weight are reversed. By levers of the first and second classes we gain power and lose speed; by those of the third class we lose power and gain speed.

Compound levers consist of a number of levers so arranged that the power arm of one acts upon the weight arm of the other. Their effect is to increase the power of the lever. They are illustrated by the hay scale, in which the weight of the hand may balance a load of hay. See WEIGHING SCALE.

LEVER, CHARLES JAMES (1806-1872), an Irish novelist, born in Dublin and educated at Trinity College. In March, 1834, he contributed his first paper to the newly started *Dublin University Magazine*, and the first chapter of *Harry Lorrequer* appeared in that magazine in 1837. Among his later novels are *Charles O'Malley*, *Tom Burke of Ours*, *Jack Hinton*, *Arthur O'Leary* and *Roland Cashel*. The lively humor which is considered characteristic of Lever is more in evidence in his early than in his later writings. For the last thirty years of his life he was in the diplomatic service, holding appointment as consul at Spezia and Trieste.

LEVIATHAN, the name applied in *Job* XLI and elsewhere in the Scriptures to an aquatic animal variously held to be the crocodile, the whale or some species of serpent.

The word is Hebrew for *long-jointed monster*.

The name *Leviathan* was given the German steamship *Vaterland* after it was taken over by the United States in 1917. It was at the time the largest ship afloat.

LEVIS, *le vee'*, or **POINT LEVI**, QUEBEC, capital of Levis County, on the Saint Lawrence River, opposite Quebec. It is served by the Canadian National Railway and the Quebec Central Railway, and is connected with Quebec by ferry and by a cantilever bridge. The city has a college, a hospital and convents. There are machine shops, an iron foundry, boot and shoe, cigar, soap, woolen and other factories and lumber mills. The first settlement was made in 1647, and it became a city in 1861. Population, 1931, 11,724.

LE'VITES, the name generally employed to designate not the whole Jewish tribe that traced its descent from Levi, but a division within the tribe itself, in contradistinction to the priests, who are otherwise called the "sons of Aaron." They were the ministers of worship, especially singled out for the service of the Temple, and with the priests formed the priestly tribe. A permanent arrangement was made for their maintenance. In place of territorial possessions they were to receive tithes of the produce of the land, and in their turn to offer a tithe to the priests. After the settlement in Canaan, forty-eight cities, six of which were cities of refuge, were assigned to the tribe of Levi, thirteen of the total number being set apart for the priests. To the Levites was to belong the office of preserving, transcribing and interpreting the law, and they were to read it every seventh year at the Feast of Tabernacles. Their position was much changed by the revolt of the ten tribes, and in later history they merely performed minor tasks about the Temple.

LEVIT'ICUS, the third book of the Old Testament, containing the laws relating to the priesthood and to sacrifices. In the Greek translation it was called "the Levitical book," *Levitical* meaning *priestly*. It contains besides the laws considerable historical matter, and is a continuation of *Exodus*.

LEWIS, MERIWETHER (1774-1809), an American explorer, who gave his countrymen their earliest knowledge of the far West, was born near Charlottesville, Va. He fought in the United States army during the Whisky Rebellion in 1794 and later became an ensign and captain in the army. In 1801, Presi-

dent Jefferson appointed him his private secretary, and two years later he was chosen to lead an expedition for the purpose of exploring the territory recently acquired from France (see **LEWIS AND CLARK EXPEDITION**). As a reward for his service in this expedition, Congress voted him 1,500 acres of land, and he was appointed governor of Louisiana Territory in 1807. He displayed energy and ability in administration and during his incumbency prepared a valuable account of his journey.

LEWIS, SINCLAIR (1885-), an American author, born in Sauk Rapids, Minn. After graduating from Yale in 1907, he was for a time reporter on a New Haven paper, and also served in an editorial capacity for a publishing house. His first attempt at fiction (*Our Mr. Wrenn*) attracted little attention. *Main Street* (1920) established his reputation. This was a novel satirizing the narrowness of life in the average town of the Middle West and the hollowness of the superficial attitude of the more intellectual critics of that life. In 1922, Lewis published *Babbitt*, a study of the complacent American. The name passed into general usage, as expressive of a type easily recognizable in American society.

He followed this success with *Arrowsmith* (1924), a satiric study of the medical profession, *Elmer Gantry* (1927), *The Man Who Knew Coolidge* (1928), *Dodsworth* (1929), *Ann Vickers* (1932).

In 1930 the Nobel Prize in Literature was awarded to Lewis, the only American who has been so honored.

LEWIS AND CLARK EXPEDITION, a famous tour of exploration under the leadership of Meriwether Lewis and William Clark, whose purpose was to explore the territory between the Mississippi River and the Pacific Ocean. It was undertaken the year after the purchase of Louisiana Territory, and was inspired by President Jefferson.

The party left Saint Louis, Mo., May 14, 1804, ascended the Missouri River, wintered among the Mandan Indians in North Dakota, again set out in April, 1805, crossed the Rocky Mountains in September and came in sight of the Pacific Ocean, November 7. They started on their return in the following March and arrived at Saint Louis, September 23, after a journey of 8,500 miles. The trip resulted in the collection of a great mass of exceedingly valuable information concerning the geography, climate, natural products

and animal life of the region explored. The exploit also eventually secured the Oregon country for the United States.

One of the heroic figures of the expedition was Sacagawea, Indian wife of the French interpreter. This woman rendered invaluable assistance in securing friendship of the Indians over the Great Divide. A statue of her stands in Portland, Oregon.

LEWIS AND CLARK EXPOSITION, an industrial exposition held at Portland, Ore., in the summer of 1905, to commemorate the one-hundredth anniversary of the journey of Lewis and Clark from the Mississippi River to the Pacific coast. The exposition buildings were artistically grouped on a beautiful site covering 406 acres, facing two attractive bodies of water.

LEWISTON, MAINE, in Androscoggin County, thirty-five miles north of Portland, on the Androscoggin River, and on the Grand Trunk and the Maine Central railroads. It has many factories, of which the most important are cotton and woolen mills; power is furnished by falls in the river. There are also extensive bleaching and dye works and manufactures of boots and shoes, lumber, machinery and various products. Bates College is located here, and the city has a public park, a city hall, a Federal building, a Carnegie Library, two hospitals, two convents, and a civic auditorium. The place was settled in 1770, was incorporated as a town in 1795, and chartered as a city in 1863. Population, 1920, 31,707; in 1930, 34,948.

LEXINGTON, KY., the county seat of Fayette County, about 100 miles south of Cincinnati, on the Chesapeake & Ohio, the Louisville & Nashville and the Southern railroads. The city is in the famous "blue grass region" and is the chief market for the products of that section. The greatest industrial enterprises center around the tobacco crop; Lexington is the world's largest market for loose-leaf tobacco. Near the town are some of the finest stock farms of the country. In former years one great product of Lexington was Bourbon whisky. Lexington has a Carnegie Library, and is an important educational center, being the seat of Kentucky University, Sayre College, Hamilton Female College, Saint Catherine's Academy and Transylvania University. The Kentucky reform school is here; the charitable institutions are the state asylum for the insane,

Saint Joseph's Hospital, an industrial home for negroes and the Good Samaritan Hospital. Henry Clay had his home in Lexington for many years; his old estate is five miles south of the city.

The first settlement was made in 1775; in 1782 the town was incorporated, and when Kentucky became a state it was made the capital. The city manager form of government is in operation. Population, 1920, 41,534; in 1930, 45,736.

LEXINGTON, BATTLE OF, the first battle of the Revolutionary War, fought at Lexington, Middlesex County, Mass., April 19, 1775. A British force of 800 soldiers had been dispatched by General Gage to seize the stores which had been collected at Concord by the colonists and to capture Samuel Adams and John Hancock, who were said to be in hiding at Lexington. News of the expedition was carried through the country by Paul Revere, who rode from Charlestown to Lexington. When the soldiers reached the latter point, they were confronted on the Common by about seventy militiamen. The British commander, Pitcairn, demanded that the company disperse, and some one, minute-man or grenadier, fired a shot. A brief skirmish ensued, in which eight militiamen were killed and ten wounded. At Concord the British found the stores removed and encountered another force of about 400 militiamen, who forced them to make a rapid retreat towards Boston. On the route they were constantly harassed by bands of farmers who fired upon the British columns from behind rocks and trees. The loss to the British was 273 men.

Lexington is a village eleven miles northwest of Boston. The famous ride of Paul Revere to the town is the theme of a stirring poem by Longfellow. It may be found in these volumes in the article **READING**.

LEYDEN, or LEIDEN, *l'iden*, **NETHERLANDS**, an important educational center, situated twenty-two miles southwest of Amsterdam. The most important educational institution is the university, formerly one of the most famed in Europe. In normal years it is attended by about 900 students, nearly one-half studying law. Leyden has cloth and other manufactures, although it is no longer so famous for its textiles, as it was during the fifteenth century. The historical event for which Leyden is most famous is the siege by the Spaniards in 1573-1574 and the

relief by the Prince of Orange, who had the dikes opened and the country flooded. The Pilgrims started from Leyden to found the colony at Plymouth, Mass. The city was the birthplace of Rembrandt, Jan Steen and Gerard Dou, eminent painters. Population, 1933, 72,058.

LEYDEN JAR, an early form of electrical condenser, introduced to the scientific world in 1746 by Muschenbroek of Leyden, hence its name. It consists of a glass jar with conducting coats, usually of tin foil, which reach one-half or two-thirds of the way to the top on the inside and outside. The mouth is closed by a wooden cover. A metal rod, with a knob at the top, is fixed upright in the cover and connected with the inside coating; when the jar is to be charged, the knob is connected with one terminal of a source of high-voltage electric charges such as an electric machine (which see), and the outside is connected with the other terminal or with the earth. The jar is discharged by connecting the outside coating with the inside through the knob. To store a larger charge, a battery of several jars may be arranged so all the outer coatings are connected together and to the earth, and all the knobs are connected together. The capacity of such a battery is the sum of the capacities of its separate jars. (See **ELECTRICITY**.)

LHASA, or LASSA, *lah'sah*, **TIBET**, capital of the country and the sacred city of its people. It is situated on the Kyi-ch'u, a tributary of the Brahmaputra. All the public edifices worthy of notice are connected with the Buddhist religion, as Lhasa is a great center of Buddhism and is visited by thousands of pilgrims from China, Turkestan and Nepal. Lhasa is the principal emporium of Tibet, silk stuffs, tea and other articles being here exchanged for Tibetan, Indian and European goods. Late in the eighteenth century a law was established that no foreigner should enter the city, but it was entered by British forces under Colonel Younghusband in 1905. Population, about 15,000.

LIBAU, *le'bou*, was a Russian city until the revolution of 1917, then was joined to the provisional government of Courland, and in 1920 became a city in the new republic of Latvia. It lies at the end of a sandy peninsula, separating Lake Libau from the sea. The city is a prosperous commercial and manufacturing center, exporting large quantities of petroleum, grain, flax, timber,

dairy products and other commodities. It had large factories, grain elevators, etc., and numerous educational institutions. Population, 1930, 57,240. See COURLAND; WORLD WAR.

LIBEL, in law, the act of publishing malicious statements with the intent to expose persons to public hatred, contempt or ridicule. The difference between libel and slander is that in the former case the defamation must be in writing, printing or in some other visible manner, while in the latter the offense is committed verbally (see SLANDER). Publication is held to have taken place if the libel is seen by but one person other than the person libeled. In criminal law it is a misdemeanor to publish, or threaten to publish, a libel. In the United States the punishment for this offense is imprisonment.

Recent legislation and decisions in this branch of law have a tendency to limit liability for action to purely false, scandalous and malicious libels. Truth, if published with good motives and for justifiable ends, is now admitted as a good defense; and even an innocent motive alone is so considered, though the statements may prove untrue.

LIBERAL, in a broad sense a person who advocates the principles of freedom, reform and progress. Within recent years the term has been applied specifically to the political parties in Great Britain and Canada which work for reforms, and are opposed by the Conservatives, who are slow to advocate changes. There have been within recent years in England a number of statesmen high in Liberal leadership, notably Asquith and Lloyd George. Sir Wilfrid Laurier was the greatest modern Canadian Liberal; William Lyon Mackenzie King led the party during later years.

In the United States people of politically liberal tendencies have thus far not joined to form a party. Several times a third party announced along liberal lines has made a brief bid for favor, but the American tendency has been toward a nation of two strong parties. Therefore both the Republican and Democratic parties contain both liberals and conservatives, but lines of cleavage are appearing. Observers declare that the time will come when the liberal elements of both parties will either form a new party or take over one of those now existing; in such event, the conservatives and liberals will align themselves here much as in Great Britain.

LIBERAL REPUBLICAN PARTY, the name given to a coalition of political factions during the presidential campaign of 1872. It was organized by Missouri Republicans under Carl Schurz as a protest against the Reconstruction policy of Congress following the Civil War and in favor of tariff reform and civil service reform. The national convention was held in January, 1872, at which Horace Greeley was nominated for President and B. Gratz Brown for Vice-President, the issues being the same as in Missouri, with the omission of the tariff question. The Democratic convention accepted the Liberal Republican candidates; but a small Democratic element made independent nominations. After a campaign remarkable for its bitterness and for the widespread interest it aroused, the party was so badly defeated that it disappeared. See POLITICAL PARTIES.

LIBERIA, the world's only negro republic, and one of three independent countries on the continent of Africa, the others being Ethiopia and Egypt. It is on the west coast, with the Atlantic Ocean extending for 350 miles on its southern side. The Ivory Coast is east, Sierre Leone is west, and French Guinea is north. It lies between 4° and 8° north of the equator. The area is about that of Ohio—43,000 square miles; the number of people is not known, but the population is supposed to be between 1,500,000 and 2,100,000, all of the African race. Only about 60,000 are civilized; these control the government; they exercise little authority over the half savage tribes of the interior.

The first settlement was made where Monrovia (named for President James Monroe), the capital, now stands. The establishment of the country was due to international efforts to make a permanent provision for freed American slaves, but which they might develop a free negro state. The initial effort succeeded so well that in 1847 the Free and Independent Republic of Liberia was constituted. The basic law is modeled after the Constitution of the United States, from which there are only trifling departures.

The agricultural development of the republic has scarcely begun, and the valuable forests are practically untouched. The products of the soil are cocoa, cotton, rice, rubber, and coffee. An American company has secured a million acres for rubber production. Gold has been found in small quantities, and there is some tin, copper, corundum and lead.

Liberia is a member of the League of Nations, which body has proposed plans for the country's rehabilitation.

LIBERTY, STATUE OF, a huge bronze statue on Bedloe's Island, in New York Harbor. It was presented to the United States by the people of France in commemoration of the one hundredth anniversary of American independence, and was placed on the island in 1885 and dedicated in the following year. The Statue of Liberty is the largest statue in the world and represents a female figure with a torch. The statue is 151.5 feet high; from the foundation's base to the top of the torch is 305 feet. A stairway extends through the statue to the head. From the base to the top of the torch there are 403 steps, and a ladder of 54 rounds extends up the outstretched right arm. The hand of the statue is 16 feet 5 inches long, the index finger 8 feet, and the fingernail 13 by 10 inches. The figure was designed by Frederic Bartholdi, a French sculptor. The cost of the work was defrayed by popular subscription, and many French school children contributed to the fund. Its donors gave the statue the name "Liberty Enlightening the World." On October 28, 1936, fifty years after the dedication of the Statue of Liberty, appropriate ceremonies were held in New York in commemoration of the event, in which President Roosevelt participated. See illustration, NEW YORK CITY.

LIBERTY BELL, the bell which hung originally in Independence Hall, Philadelphia, and first pealed forth the news of the signing of the Declaration of Independence. It was cast in England in 1752, and bears the inscription: *Proclaim liberty throughout all the land unto all the inhabitants thereof (Lev. XXV, 10)*. The bell was cracked at its first ringing, was recast in 1753 and was again cracked while tolling on the funeral day of Chief Justice John Marshall, July 8, 1835. It is on exhibition at Independence Hall, Philadelphia, where it is viewed by thousands. It has been loaned to several expositions.

LIBERTY BONDS, the patriotic name applied to United States government bonds issued after the nation entered the World War (which see). Never before had the country needed such vast sums of money for immediate use, and but a small part could wisely be raised by taxation. The people had never been taught to buy bonds of any character as

an investment, and the first issue, it was believed, was absorbed as a patriotic duty; by many people it was not viewed as a personal benefit. However, the second and subsequent loans, larger and larger in the aggregate, were taken by millions of people who for the first time in their lives were developing the money-saving habit.

The first issue was put out at 3½% interest; the second, at 4%; the third and fourth, at 4½%; the fifth (Victory Loan) at 4¾%. Purchasers of early issues were permitted to convert their holdings into bonds bearing 4½%. The various issues and the amounts subscribed are given below:

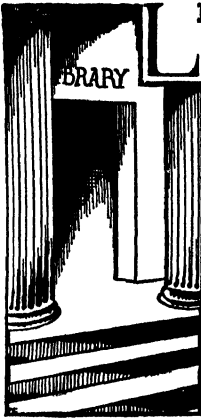
DATE OF ISSUE	AMOUNT ASKED	SUBSCRIBED
June 15, 1917	\$2,000,000,000	\$3,035,226,850
October 1, 1917	3,000,000,000	4,617,532,300
March 15, 1918	3,000,000,000	4,158,599,100
Sept. 15, 1918	6,000,000,000	6,954,875,200
April 21, 1919	4,500,000,000	6,100,000,000

LIBERTY CAP, a symbol used on various American coins, copied from a form of headdress worn by freed slaves in ancient Rome. A design consisting of a cap between two daggers was stamped on coins by order of Brutus and Cassius, the assassins of Caesar. At the time of the Dutch revolt against Spain the Netherlands adopted the liberty cap as a symbol of freedom, and it appeared at the time of the French revolution as the *bonnet rouge*, or red cap, of the revolutionists. The liberty cap is sometimes seen in national coats of arms.

LIBERTY OF THE PRESS, the liberty of every citizen to print whatever he chooses, under the limitation of being liable for abuse of that liberty. The right of printing rests on the same abstract grounds as the right of speech, yet it is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right. The Constitution of the United States and those of many of the states declare for liberty of the press. There is complete liberty in Canada; in France and England the press is also free, but in Germany and Soviet Russia, as fruits of dictatorial government and the revolution, strict censorship has destroyed much of the value of the press to the people. The Italian press takes its political opinions from Fascist rulers.

LIBERTY PARTY, a political party organized in the Northern states of the Union about 1839, its purpose being to oppose slavery by political action. Its formation in

reality voiced a protest against the non-resistant and non-participant attitude of Garrison and his radical followers. James G. Birney was the first candidate of the party for President. The ticket polled only about 7,000 votes, more than one-third of which were cast in New York state. In 1844, another convention again nominated Birney for President. In this election the Liberty party polled 62,000 votes. Moreover, by drawing many votes from the Whig party in New York, it defeated Clay and elected James K. Polk. Its last candidate was John P. Hale, who, however, withdrew after Van Buren's nomination by the Free-Soil party, in 1848. See **POLITICAL PARTIES IN THE UNITED STATES.**



LIBRARY, a term which is used with several meanings, all of which have some connection with books. The word is derived from the Latin *liber*, which means *book*. The ancient Romans had another word, *libraria*, which they applied to a place where books were sold. At the present time *library* may mean a building containing collections of books, it may signify a

room in a private house containing books, or it may refer to the books themselves. The greater number of people are interested in public libraries, now found in most towns and cities throughout the civilized world. The influence for good which they have wielded in disseminating information and raising the standards of general culture can hardly be estimated.

In large cities the public library is an institution of many departments. There is, first of all, the circulation department, the books of which are borrowed by holders of cards for a specified length of time. In connection with this department there is sometimes maintained an open-shelf division, where books may be examined by the reader, and a selection be made from those on the shelves. The public does not, of course, have direct access to the major portion of the books, as this would not be practicable in a large city. Catalogues are available to all card holders, and lists of books desired are handed to attendants who make selections

from the stacks in the rear of the circulating department.

The reference room, which contains comfortable tables and chairs, is another important department, and one very popular with those who desire a quiet place in which to study. Readers in this department are privileged to use any number of books or magazines while they remain in the room. The borrowed volumes are returned to the main desk when the reader is through with them. Another department, called the reading room, is used by those who wish to consult current magazines and newspapers. In large libraries there are also other special departments, such as the civics room, music department, children's room, etc.

The main building of the largest free circulating library in the world—the public library of New York City—contains besides its book collections valuable collections of sculpture, painting and pottery. This institution maintains also more than forty branch libraries. The branch libraries are likewise a feature of the public library system of Chicago, Boston, Philadelphia and other large cities. In Canada, cities like Toronto and Montreal maintain public libraries similar in plan and equipment to those of the great American cities, and in the Dominion as a whole there are several hundred of these institutions.

Besides the libraries supported and controlled by the city governments, there are in America a number of endowed reference libraries giving the public service free. The John Crerar Library of Chicago, for example, is a splendid science library, and the Newberry Library, in the same city, contains valuable collections in literature and history. Though books may not be taken out of these libraries, they are at the disposal of any who wish to refer to them. Other libraries of prominence are the Boston Athenaeum, and Pratt Institute Free Library, of Brooklyn.

Among the largest and most famous libraries in the world are: the Bibliothèque Nationale, in Paris, nearly 8,000,000 volumes, maps, and manuscripts; the British Museum (London), with 4,200,000 books, manuscripts, charts, maps, etc.; the Lenin Library (Moscow), 5,540,000 items of all kinds; the Congressional Library (Washington), 7,757,000 items; New York Public Library, 3,500,000 books; the Public Library at Leningrad, 5,175,000 items.

LIBRARY OF CONGRESS, a library at Washington, D. C., established by the United States government in 1800. It was destroyed in 1814 at the burning of the Capitol by the British, but received a new start with the purchase of the library of Thomas Jefferson. It was again partially destroyed in 1851, but since that time it has constantly increased in extent and value until it now contains more than 4,500,000 volumes, and more than 2,000,000 maps and music scores and 500,000 prints besides charts, photographs, engravings and manuscripts. It is the largest library on the western hemisphere and one of the finest in the world. It is especially rich in history and political science and in collections of American newspapers. The library is replenished through regular appropriations by Congress, through gifts and exchanges and through the addition of copies of all books copyrighted in the United States.

In 1897 the library was removed from the Capitol to a special building begun in 1889 and completed at a cost of \$6,500,000. It stands just east of the Capitol building. Its ground plan is oblong, covering three and three-fourths acres of ground, and it has a floor space of more than eight acres. The building is of Concord granite on a framework of steel, and the interior walls are encased and decorated wholly with stucco and marble. The vast copper dome terminates 195 feet from the ground in a gilded torch of learning. The decorations represent the finest work of American artists.

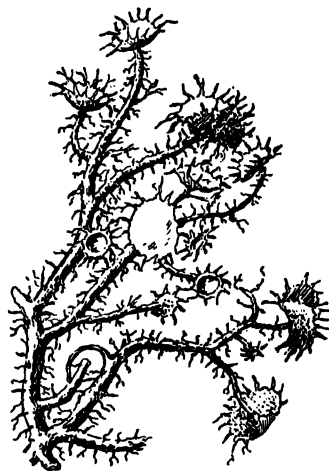
LIBYA, an Italian colony in North Africa, on the Mediterranean, combining Tripolitania and Cyrenaica. See **TRIPOLITANIA**.

LICENSE, *l'ens*, in law, is permission to do some act, otherwise unlawful; also the name is given to the document conferring such authority. All civilized countries require that persons should not carry on certain trades or professions or do certain acts without previous grant of license, and such licenses are imposed for the sake of regulation and of raising revenue. The most common licenses are issued to empower persons to sell such articles as liquors, to peddle, to assemble in public meetings, or to keep certain animals, such as dogs. In regard to the sale of liquor, the license question is a serious national issue in the United States, as the source of a heated controversy between the *Prohibitionists*, who would forbid the liquor traffic; the advocates of *low license*, who

would collect a license as a source of revenue, but not for regulation, and the advocates of *high license*, who would collect the license primarily for regulation of the business and secondarily for revenue. The repeal of the Eighteenth Amendment by the adoption of the Twenty-first returned to each of the states the control of its liquor problem.

LICHENS, *l'kenz*, a very extensive order of flowerless plants which have neither stem nor leaves, but consist mainly of a leaflike thallus, which derives its nourishment from the air. According to theory generally accepted, lichens represent a combination of fungus spores and algae.

Probably 4,000 species of lichens have already been described, and doubtless more will be found. They are gray, yellow or brown in color, and they sometimes present a beautiful and varied appearance. They are found in greatest variety in high mountain regions and in Polar



A LICHEN

lands, where they are the principal form of vegetation. Some species are widely distributed, being found in almost all parts of the northern hemisphere. Some are valuable articles of food, as the Iceland moss, which grows abundantly in the northern regions, and the so-called reindeer moss, which is the chief article of food for reindeer and other animals during the cold winters. Several dyes and litmus, so extensively used in chemistry, are lichen products. The chief service which the lichens perform in nature is to pave the way for plants of higher orders. They are able to derive their subsistence from the air. Growing as they do upon exposed rocks and in barren soil, they dissolve the rock and soften the soil, and in time, when their decaying bodies mix with the soil, they enrich it so that more highly developed plants can grow there.

LICK OBSERVATORY, *ob zurv'a to ry*, an astronomical observatory in California, situated on Mount Hamilton, 4,285 feet above sea level, and about twenty-five miles east of San José. The telescope is the second-largest refracting telescope in the world. The objective has an aperture of thirty-six inches, being exceeded only by the 40-inch telescope of Yerkes Observatory at Lake Geneva, Wisconsin. The point of suspension of the telescope tube is thirty-six feet from the floor, and the diameter of the dome is thirty-six feet. In 1892 Edward E. Barnard discovered at this observatory the fifth moon of Jupiter.

James Lick (1796-1876), for whom the observatory was named, was born in Fredericksburg, Pa. He engaged in the manufacture of pianos and in 1847 settled in California, where he accumulated a large fortune by real estate investments. In 1874 he placed \$3,000,000 in the hands of trustees, for use in the promotion of educational enterprises. Of this, \$540,000 was given for a school of mechanical arts and \$700,000 was granted to the University of California for the erection of the observatory described above.

LICORICE, or **LIQUORICE**, *lik'o ris*, a name for several herbs of leguminous (pod-bearing) plants.

Though the purplish flowers are large and attractive, the plant is known best for its juice, prepared from the small, yellowish roots and most familiar in the form of a black, gummy substance, sold in sticks or lozenges. A great deal of the licorice sold in the markets was formerly much adulterated with cheaper materials, and this is true yet of that which comes from Spain. The pure food laws of America forbid adulteration.



LICORICE PLANT

LICTORS, in Rome, public servants, usually freedmen, who attended upon the chief magistrates—dictators, consuls, praetors and propraetors—to clear the way for them and to cause due respect to be paid to them. They carried axes tied up in bundles

of rods, called *fascēs*, as ensigns of office. The number of lictors depended upon the rank of the magistrate, a dictator having twenty-four, a consul twelve, a praetor two and a propraetor six.

LIEBIG, *le'biK*, JUSTUS, Baron von (1803-1873), one of the most eminent of modern chemists, born at Darmstadt, Germany. Through the favor of Humboldt, he was appointed, in 1825, professor of chemistry at the University of Giessen, a chair he held for twenty-five years. Later he held similar positions at Heidelberg and Munich. He is regarded as the founder of organic chemistry, owing to the many discoveries he made in this department. He did much to improve the methods of analysis; his *Chemistry of Food* has brought about a more rational mode of cooking and use of food, while agriculture owes much to his application of chemistry to soils and manures.

LIEBKNECHT, *leep'neKt*, KARL (1871-1919), a German Socialist of radical views. He was born in Leipzig, and was educated in that city and in Berlin for the law. In 1908 he became a member of the Prussian House of Deputies, and four years later won a seat in the Reichstag, the lower house of Parliament under the former German Empire. Liebknecht soon became a prominent figure because of his fearless opposition to Germany's military policy, and in December, 1914, he was the only deputy in the Reichstag who refused to vote for the war credits. He would refuse to support any war except one against capitalism, he declared, and to this course he consistently adhered.

In 1916 a large number of his fellow Socialists censured him for what they declared to be unpatriotic conduct, and as a result of radical utterances made on May 1, which is Labor Day in Europe, the German government sentenced him to a long term of imprisonment. He was not released until shortly before the armistice was signed, in November, 1918. His release was the occasion of violent demonstrations in Berlin, and in the revolution which followed he figured as a leader of the Spartacus group, the most extreme Socialist faction in Germany, who followed the practices of the Bolsheviki of Russia. In January, 1919, he was shot and killed by soldiers who were taking him to prison, from whom he tried to escape.

LIECHTENSTEIN, *leeK'ten stine*, an independent state of Europe, bounded on the

north and east by the Austrian province of Vorarlberg and on the south and west by the Swiss cantons of Graubunden and Saint-Gall. The western boundary is the Rhine. The surface, except in the western part, is covered with mountains, branches of the Rhaetian Alps. The chief industries are agriculture, stock raising, weaving and the production of wines and various wooden articles.

Liechtenstein has an area of sixty-five square miles. Its inhabitants are of German origin and adherents of Roman Catholicism. Population, 1930, 10,213.

LIEGE, *le ayzh'*, BELGIUM, at the outbreak of the World War, the most important manufacturing city in the kingdom. It was the chief Belgian center for the making of firearms and railroad equipment, and contained also important woolen mills, tanneries, zinc foundries, watch factories and leather establishments. Liège is the capital of the province of Liège, and is situated fifty-four miles southeast of Brussels, on both sides of the Meuse River. It lay directly in the path of the German advance, and was the first city to resist the invasion of August, 1914. After a stubborn resistance against bombardment from siege guns, it was captured on August 7, and until late in 1918, it was in German hands.

Liège was founded in the sixth century and by the end of the tenth century was so powerful that it was recognized as an independent principality. In 1830 it became a part of Belgium. Population, 1933, 164,908.

LIEN, *leen*, in law, in its most usual acceptance, "the right which one person, in certain cases, possesses of detaining property placed in his possession belonging to another, until some demand of the one possessing the property is satisfied." In the United States liens are of two kinds:

(1) **Specific Liens**, where the person in possession of goods may detain them until a claim, which accrues to him from those identical goods, is satisfied; such are the lien on baggage, possessed by hotelkeepers or common carriers; on goods sold but remaining in possession; of workmen on the product of their labor.

(2) **General Liens**, where the person in possession may detain the goods, not only for his claim accruing from them, but also for the general balance of his account.

LIEUTENANT, *lu ten'ant*, a junior military officer in all armies. There are two grades. A second-lieutenant is the lowest commissioned officer, in rank above the ser-

geant, who is a non-commissioned company officer. A first-lieutenant ranks above a second-lieutenant, and below a captain. The salary of a first lieutenant, depending on length of service, is \$1,500 to \$2,400; of a second lieutenant, \$1,500 to \$2,000. Besides, each officer is granted a subsistence allowance. The duties of a lieutenant are to assist his captain and supervise routine detail in his company. There are usually one first- and two second-lieutenants in each company. See RANK IN ARMY AND NAVY.

LIEUTENANT-GENERAL, in the United States the officer next in rank to general in the military establishment. Usually, in peace time the rank is allowed to lapse; and then the chief of staff only has the rank of general. Scott, Grant, Sherman, Sheridan, Schofield, Miles, Young, Bates, Chaffee, McArthur, Liggett, Corbin, Bullard, and Jadwin have been honored with the rank of lieutenant-general. The two last named were eminent commanders in France under Pershing. The salary is \$9,000 per year. Additional allowances are usually given for service on foreign soil. See GENERAL; RANK IN ARMY AND NAVY.

LIEUTENANT-GOVERNOR. The chief executive of a province of the Dominion of Canada, appointed by the Governor-General in council. He ordinarily holds office for five years, but he may be dismissed by the Governor-General for "cause assigned," which in accordance with the constitution, must be communicated to Parliament. He is, therefore, an officer of the Dominion, as well as of the province. His position in the province corresponds almost exactly to that of the Governor-General in the Dominion. He appoints his executive council, and is guided by their advice so long as they retain the majority and confidence of the assembly. He can summon, prorogue, and dissolve the assembly, make appointments to office, and perform all executive acts, with the advice of the council, which are necessary for the government of the province. The salary is \$10,000 per year in Ontario and Quebec; \$7,000 in Prince Edward Island; \$9,000 in the other provinces. See GOVERNOR-GENERAL.

In the United States there are lieutenant-governors in nearly all of the states. The office is relatively unimportant, except that the incumbent succeeds to the governorship in case of a vacancy in that office. He is, however, the presiding officer in the state

senate, and in that post wields considerable political influence.

LIFE, LENGTH OF. See **LONGEVITY**; **MORTALITY, LAW OF.**

LIFE'BOAT, a special boat for saving persons from shipwreck. The first lifeboat was patented in Great Britain in 1785, but a very successful improved form was introduced in 1789 and remained almost the only one in use till 1851. Since that time many improvements have been made, so that now strong and serviceable boats, so constructed that it is almost impossible to upset them, capable of carrying heavy loads and fully prepared for all the emergencies of a shipwreck, are in use at the life-saving stations on the coasts of the great nations. Modern lifeboats are so constructed as to discharge water that breaks into them, and are propelled by motors. See **LIFESAVING SERVICE.**

LIFE INSURANCE, in *shoor'ans*. See **INSURANCE.**

LIFE PRESERVER, or **LIFE BUOY**, *boi*, a device intended to support persons who have fallen into the water, until assistance can reach them. The common life buoy consists of a ring of canvas, stuffed with cork. The ring is usually about thirty inches in diameter, and has one or more loops on the outer rim, to which a life line can be attached. When in use the buoy is placed around the wearer under the arms, and is usually put on over the head. Another common style of life buoy consists of a sort of jacket, made of connected plates of cork covered with canvas. This is buckled around the body under the arms and serves the same purpose as the ring buoy.

LIFE-SAVING SERVICE, an organization in each of the principal maritime nations for the preservation of life along the sea-coasts, particularly at dangerous places along the paths of ocean commerce. In January, 1915, the life-saving service and the revenue-cutter service of the United States were united under the name of Coast Guard. Under that title the organization is discussed in these volumes.

In England. Here the government does not exercise direct control over the life-saving establishment; it is in the control of the Royal National Lifeboat Institution, founded in 1824. It is maintained, without profit, at a cost of over three-quarters of a million dollars a year, by voluntary contributions. Patrons of the service include the

highest personages in the realm. There are 275 stations under its management.

In Canada. The government supports the Canadian service, which was established in 1880. There are twenty-four stations, all but five (motor-boat stations) being operated on the voluntary system.

In Other Countries. France has a volunteer service, organized in 1865, with the English service as a pattern. In Germany the organization is also voluntary, and has existed since 1865. There are about 100 stations on the Baltic and North seas. The Belgian stations were organized by the government in 1838, and are supported entirely by the state. In Italy there is one general volunteer society, with numerous local organizations. In Denmark the government organized the service in 1852, and has since controlled it. Japan's organization is private, but has had government support since it came into existence in 1889.

LIFE-SAVING GUN AND ROCKET.

At nearly every life-saving station is a mortar, loaded with gunpowder and with a projectile with a line attached to it. The missile in one form is armed with curved barbs, something like the flukes of an anchor, which are intended to grapple the rigging or the bulwarks of a ship. The mortars may be discharged with accuracy at a range of from 700 to 1,000 yards. The object of the discharge is to carry a life line to a vessel in distress. A so-called *rocket* is also sometimes used. It is fired in the ordinary way, but in its head is a line that uncoils as the rocket speeds toward its mark.

LIG'AMENT, in anatomy, a strong, inelastic white body which surrounds the joints and connects bones, or which strengthens the attachments of various organs or keeps them together. Every joint is surrounded by a capsular ligament; the tendons at the wrist and ankle are bound down by what are called the annular ligaments. In dislocation of joints the capsular ligament is often broken.

LIG'GETT, HUNTER (1857-1935), an American military leader, commander of the first corps of the army which won the Battle of Saint Mihiel, in September, 1918. He was born at Reading, Pa. After graduating at the West Point Military Academy, in 1879, he was appointed second-lieutenant of infantry. Thereafter he rose steadily in the service, had an active part in the Philippine campaigns, was an instructor in the

war college and served as a member of the general staff. In March, 1917, he became a major-general in the regular army, and after America's entrance into the World War he was appointed lieutenant-general for the duration of the war. His first corps had an honorable part in the victory of Saint Mihiel, and early in October, 1918, on the reorganization of the American forces, he was given the immediate command of the First Army; a newly constituted Second Army was placed under command of General Bullard. In May, 1919, he assumed command of United States troops in the occupied zone centering in Coblenz, Germany. He was retired in 1921.



LIGHT, *lite*. Everyday experience tells us that we see objects by the aid of something that comes from them to the eye, and that this agent is thrown off by the sun and other bright objects. We call this agent *light*. Like sound (which see), light is produced by vibrations or waves, but there are several important differences. In the first place, it is not a vibration of air, but of a finer medium, known as ether, which penetrates between

the small particles of ordinary matter. Just what ether is, nobody knows; scientists assume that it exists. Another difference is that sound may travel around corners and curves—that sound waves need not flow in a straight line—but light waves flow only in straight lines.

Where Light Comes From. So far as we know, light is given off only by very hot bodies. The sun is the great source of light, as well as of heat. The stars also are sources of light, a small portion of which comes to us. Other sources are chemical and mechanical action. The lights used to light our houses and streets are from one or the other of these sources. Candles, lamps and gas jets give off light by burning. The burning is caused by the union of the oxygen of the air with the carbon in the tallow, oil or gas. This is a form of chemical action. Electric lights are produced by friction, which is a form of mechanical action (see **ELECTRIC LIGHT**). Bodies that give off light are called

luminous. Luminous bodies give off light equally in all directions.

Some Interesting Facts. Light travels through substances of uniform density in straight lines, called *rays*. For this reason we cannot see through a bent tube or around the corner of a house. Light travels at the rate of about 186,276 miles per second, and requires eight minutes and nineteen seconds to pass from the sun to the earth. Many of the stars are so far away that it requires a great number of years for their light to reach our planet. Sound travels only 1,090 feet a second when temperature is at the freezing point. This fact explains why we usually see a lightning flash several seconds before we hear the thunder clap. For all distances on the earth, however, light is practically instantaneous.

A substance which allows light to pass through it freely, like glass and water, is *transparent*.

A substance that will not allow light to pass through it, as iron, tin and black cloth, is *opaque*.

A substance which allows some light to pass through it, but not enough to enable us to see objects beyond it, as ground glass, white paper and white cloth, is *translucent*.

The brightness of light varies directly as the brightness of the luminous body and decreases as the square of the distance from the luminous body increases. A lamp having a flame four times as bright as a candle will give four times as much light; an object two feet from a lamp will receive four times as much light as it will when four feet distant.

Reflection of Light. When rays of light strike an object, some of them enter it, or are *absorbed*, and others are thrown back, or *reflected*. It is by the reflected rays that we see objects. A rough surface scatters the reflected rays more than a surface that is highly polished, like a mirror, and the objects that are poor reflectors can be seen more easily than those that are good reflectors. That is because the reflected rays are so scattered that the object can be seen from any point. The reflection of the object which we see in the mirror is an *image*. Rays of light are reflected at an angle equal to that with which they strike the reflecting surface. For this reason, images of objects mirrored in bodies of water are inverted. This can be illustrated by laying a mirror on a table and

setting an object beside it. In Fig. 1, the ray from the top of the candle *A* strikes the

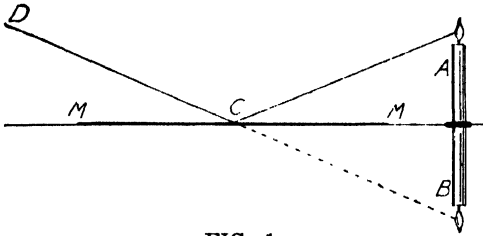


FIG. 1

mirror *MM* at *C* and is reflected to the eye at *D*; the flame is seen in the direction of the reflected ray and appears near *B*. This is true of all the rays; so the image of the candle is inverted.

Have you ever stopped to think why the image in a camera is upside down? The lens of the camera is much smaller than the object to be reflected. But rays of light travel

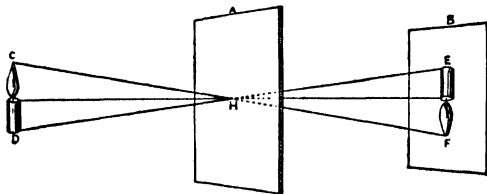


FIG. 2

in straight lines. Therefore, a ray of light from *C* must travel through the lens or hole *H* in the direction *CF*; and a ray from *D* must pass through *H* in the direction *DE*. If we hold a screen at *B* the image is caught in the position *EF*, upside down. For the same reason you always put the slides in a magic lantern upside down. Can you explain that to your own satisfaction?

Light may be reflected a number of times. We see objects by the moonlight which they reflect, and we know that the moon's light is reflected from the sun. When we see an image in a mirror, the light from the object is reflected to the mirror and from that to the eye.

Refraction of Light. When a ray of light passes from one substance to another of a different density, it is bent out of its course, or *refracted*. If we stand a stick in a pail of water, it appears to be bent or broken at the surface of the water; the handle of a spoon in a cup of clear tea presents a similar appearance. The object is seen in the direction

of the refracted ray. In Fig. 3, the stick *AB* appears bent at *C*, on account of the refraction caused by the water. The eye sees the

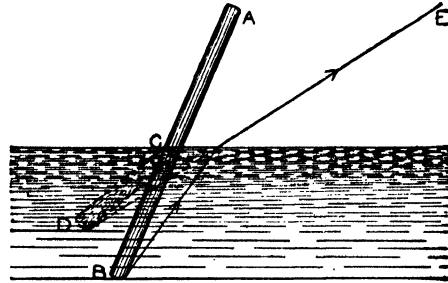


FIG. 3

end *B* in the direction of the refracted ray, and it appears at *D* instead of where it really is. This is the reason why the bottom of a vessel filled with water appears some inches above the support upon which the vessel rests.

When a ray of light passes through a triangular prism, it produces the effect shown in Fig. 4. The ray from *A* is refracted at

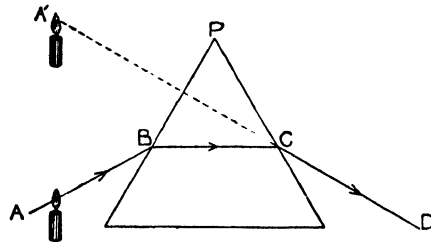


FIG. 4

B toward *C*. On leaving the prism at *C*, it is bent towards *D* and the candle is seen at *A'*.

The law of refraction is: When light passes from a rare to a dense substance, it is bent in the direction of a line that is perpendicular to the surface of the refracting body; when light passes from a dense to a rare substance, it is bent away from a line perpendicular to the surface of the refracting body.

Rays of light passing through a window pane are refracted twice, but in such a manner as to make them appear straight, as shown in Fig. 5. The ray *AB* passing through the pane *MN* is refracted at *C* and *D*, but it has the same general direction as the line *EF*.

Shadows. You can perform a few simple experiments to illustrate some of the prin-

ciples for the study of shadows. Hold a ball or round bit of cardboard between a

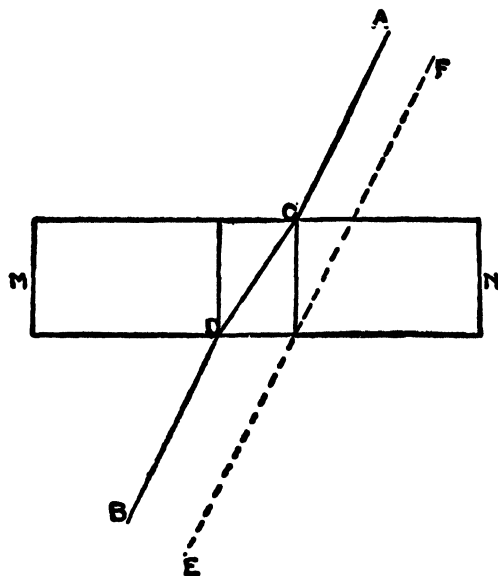


FIG 5

light and a white screen, as in Fig. 6. The space behind the object from which the light is excluded is called the *shadow*. You will find that the center of the shadow is darker than the edges; the diagram shows why. The

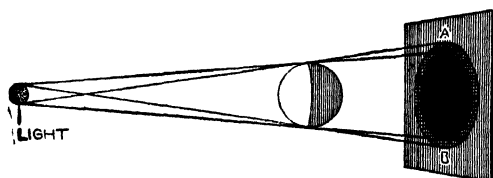


FIG 6

flame is so large that some light streams to A and B. The darker part of the shadow is called the *umbra*, the lighter part the *penumbra*. Now try experiments with a smaller flame, also vary the distances between the light and the ball, and between the ball and screen. What conclusions do you derive:

The Spectrum. When sunlight is passed through a triangular prism, the rays are separated by refraction and form the colors seen in the rainbow. The band of color so formed is called the solar, or prismatic, *spectrum*. From this experiment we learn that white light is composed of seven colors.

Related Articles. The explanation of the action of light is further illustrated in the articles:

Color
Ether
Lens
Mirror

Polarization of
Light
Prism
Rainbow

For the application of the principles of light, see:

Camera
Magic Lantern
Microscope

Spectroscope
Telescope

For a new theory of light, see *Electro-Magnetic Theory of Light*.

LIGHTHALL, WILLIAM DOVER (1857-), a Canadian poet and novelist, born in Hamilton, Ontario, and educated at the Montreal high school and McGill University. He began the practice of law in 1881, but in connection with his profession he has been a student of Canadian history and was one of the founders of the Society of Canadian Literature. He originated the series of historical tablets placed in the streets of Montreal and was a leader in the movement which secured the erection of the Maisonneuve monument. He has been a prolific writer of poems as well as books on psychology and ethics, and is the author of *Thoughts, Moods and Ideals*, a volume of poems, *Songs of the Great Dominion, Canadian Poems and Lays, Canada, a Modern Nation, The Masters of Life and The Governance*.



LIGHTHOUSE, a tower or other elevated structure bearing a light at the top and erected at the entrance of a harbor or on some rock or headland to serve as a guide or warning of danger to navigators at night. The Pharos of Alexandria, erected about 300 B. C., is, as far as known, the first structure erected expressly for a lighthouse. This tower was so high that it was reckoned among the seven ancient wonders of the world. The lighthouse of Cordouan, at the mouth of the Garonne in France, founded in 1584 and rebuilt in 1727, can be considered as the forerunner of modern lighthouses. Its tower is 197 feet high, and it is a model of strength and neatness. The first lighthouse in the United States was erected in 1716, on the north side of the entrance to Boston Harbor.

Construction. The plan of a lighthouse and the material of which it is constructed depend upon its location and the distance to which

it is necessary to throw the light. Wherever possible lighthouses are placed on high promontories or other sites on the mainland where they will be free from the action of waves, but many of them have to be located on very dangerous places and are subject to great strain from the waves and, in some instances, from floating ice. Lighthouses built in such positions are constructed of the strongest masonry. The tower is in the form of a truncated cone, gradually sloping as it ascends. The construction of the foundation is usually the most difficult and expensive part of the work, since it often happens that this must be laid under water, under such conditions that the work can be done only during periods of low water and when the sea is quiet. After the foundation is completed, the tower rises with comparatively little difficulty. The stones are doveled and cemented together so as to make the walls particularly firm. For the strongest towers the walls at the base are usually five or more feet in thickness and gradually narrow until at the top they are about eighteen inches in thickness. The interior of the tower is usually lined with brick, and between the walls there is left a narrow space for dead air.

A lighthouse is usually divided into the following sections: A cistern, for storing fresh water; a storehouse for supplies; a shop; the living rooms, for the keeper and his family, and the lantern, which surmounts the tower. All of these compartments or floors, are connected with one another by stairways.

The Lantern. This is the most important part of the structure, and only to hold it is the tower erected. The lantern consists of a light metallic frame, holding in position a series of lenses and rings, which form the sides. In the larger lights this lantern is about twelve feet in diameter and ten feet high. The number of sides or faces depends upon the style of light desired. The simplest of these lanterns have but four faces, but they may have as many as eight or ten. The center of each face contains a large plano-convex lens (see *LENS*), and this is surrounded by a series of prisms, each of which is the portion of a ring and has its sides and edges so cut and curved as to reflect all rays of light which strike it from the lamp so that they will be parallel to one another. The lantern is mounted on a vertical shaft and is supported either in a tank of mer-

cury or upon conical rollers which move over a hard, smooth metallic track. When in use the lantern is caused to revolve by clock-work, which is kept in motion by a weight. Lanterns of this style and of the best construction will throw light so that it can be seen for more than twenty miles. The light can be seen only when a face of the lantern is directly opposite the observer, hence a revolving light is a flash light, and in one revolution the lantern gives as many flashes as it has sides. By covering any side with red glass a red light is produced.

The lamp is a comparatively small structure. In small lanterns it resembles very closely the largest sized kerosene lamps having circular wicks, but in the larger lights the lamp contains two or more circular wicks arranged one within the other and each in its special tube. These lamps burn the best grade of kerosene. In many lighthouses electricity is employed for the lamps; in such instances two dynamos may be used, to insure unbroken service.

One of the greatest lighthouse lenses is in Hawaii. It is twelve feet high and directs a 940,000 candle-power beam thirty miles.

Lightships. There are many places dangerous to navigation where a lighthouse cannot be erected, and lightships are used to warn mariners of their approach to such points. The ship carries two or more reasonably high masts, from the top of which lights are suspended. It is moored near the point of danger and securely anchored.

Management. The lighthouses in the United States are under the control of the United States Lighthouse Board. This is an organization authorized by Congress in 1852 and consists of the secretary of the treasury, who is ex-officio, its president, two naval officers, two engineers and two civilians of noted scientific ability. All are appointed by the president. By them the country is divided into districts, each of which is under the management of a naval superintendent. Lighthouse tenders, which are vessels in the employ of the board, make periodical visits to all lighthouses. These ships carry inspectors who inspect the lighthouse and report upon its condition, and they also carry the needed supplies for the light and the keeper's family. See *BUOY*.

LIGHTNING, *lit'ning*, a bright flash of light between two clouds or between a cloud and the earth. That lightning and elec-

tricity are identical was proved by Franklin when he made an experiment with a kite in a thunderstorm. There are two kinds of electricity, called *positive and negative*. An electrical discharge, taking the form of a bright flash, occurs when two clouds or a cloud and the earth, oppositely charged, come close together. A flash of lightning is in reality a succession of sparks only a fraction of a second apart. There are three main forms of lightning, *chain*, or *zigzag*; *heat*, or *sheet*; and *ball lightning*.

Zigzag lightning is a line of brilliant light near to the earth; very often the line breaks into a number of forks, or branches. Sheet lightning is a bright illumination in the sky, which takes the form of a great sheet of flame. It is really the reflection of zigzag lightning which itself is invisible to the eye of the observer. Ball lightning is not very well understood by scientists. It manifests itself in balls of fire which fall out of the clouds and explode as soon as they hit the earth.

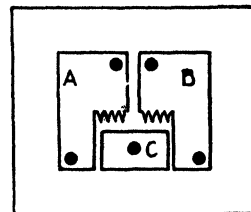
Thunder is caused by the sudden expansion and compression of the heated air along the path of the discharge. A partial vacuum is created along this path, and when the air rushes back again into the space a crash or prolonged roll is heard, according to the position of the observer. A person hears a sudden crash when the two surfaces between which the discharge takes place are equidistant from him. If he is in such a position that the ear receives the sound from different parts of the path at different times he hears a rolling sound. Clouds sometimes reflect the thunder and hills echo it, and these conditions produce a rumbling roar.

Light travels faster than sound, and that is why thunder follows lightning. The rate of which light travels is 186,000 miles per second, while the rate for sound is about 1,100 feet a second; the rate for light is thus almost instantaneous. If you count the number of seconds between the flash and the clap of thunder you can estimate the distance of the flash. If the interval is six seconds, for instance, you know that it required one-tenth of a minute for the sound waves to traverse the space. The rate being 1,100 feet for one second, for six seconds it is 6,600 feet, or 1.25 miles. When the flash is very near the interval may be so brief as to be imperceptible to the ear. In that case flash and sound seem to be simultaneous. If you hear

the thunder crash you may know that the danger from the lightning is past in so far as you are concerned. See **LIGHT**; **LIGHTNING ROD**.

How to Make a Lightning Arrester. To prevent lightning from damaging any apparatus we can make a "lightning arrester."

The sketch shows how to cut and mount three pieces of brass $1\frac{1}{8}$ in. thick. The upper binding posts on A and B should be connected to the live wires; the lower binding posts to



LIGHTNING ARRESTER

the instrument, and the post on C to a ground wire. Any charge of lightning will jump from A and B to C and will run into the ground without harming the instrument.

LIGHTNING ROD, a device by means of which elevated structures are protected from damage by lightning. It was invented by Benjamin Franklin in 1752, and since then the idea has been adapted in various ways. The modern lightning rod is a metal rod or tube bearing one or more sharp points at the top. These rods are securely attached to the projecting parts of a building and at intervals along high horizontal parts. They are then carefully connected with one another, with any metal parts of the building, and with the moist earth by thick strips or cables of iron or copper. No insulators are used. The sharp points prevent many strokes of lightning by quietly discharging the electricity which accumulates on buildings as the charged clouds pass over. When flashes do occur, the conductors carry the electricity harmlessly to the earth. See **LIGHTNING**.

LIGHTSHIP. See subhead, in article **LIGHTHOUSE**.

LIGNITE, a soft, brownish-black coal, midway between peat (which see) and bituminous, or soft, coal. Any coal may be called lignite in which the texture of the original wood may be traced, but geologists restrict the name to the immature deposits of the Tertiary Period, which is much later than the age in which the great coal deposits were formed (see **CARBONIFEROUS PERIOD**). Lignite, then, is a brownish fuel with a definite woody structure. It burns with a smoky flame and has relatively low heating power. For distribution, see **COAL**.

LI HUNG CHANG, *le hoong chahng*, Earl (1822-1901), a Chinese statesman, one of the foremost diplomats of his age. As governor of the Kiang provinces, he put down, in conjunction with General Gordon, the Taiping rebellion. He was viceroy of the province of Chi-li and Senior Grand Secretary of State from 1870 to 1894. Earl Li was commander of the Chinese forces during the war with Japan and negotiated the treaty of peace. In 1896 he represented his government at the coronation of the czar and visited the United States. After he had returned to China he became the real head of the foreign office. In 1899 he was decorated with the Double Dragon, an unusual honor, and in 1900 he was appointed with Prince Ching to negotiate a treaty with the foreign powers operating in China. Li Hung Chang managed the affairs of his country with consummate skill. He was a friend of Western culture, and to him is due much of China's progress during the latter part of the nineteenth century.

LILAC, a shrub belonging to the olive family, cultivated commonly in gardens for its large clusters of fragrant flowers. Many varieties are known, both single- and double-flowered, and white, blue or purple in color. The common lilac, which was introduced into Europe from Northern Persia, grows freely in almost any good soil and spreads rapidly by means of suckers.

LILIUOKALANI, *le le oo o ka lah'ne*, LYDIA KAMEKEHA (1838-1917), the last independent ruler of the Hawaiian Islands. She succeeded her brother, King Kalakaua, in 1891, but immediately aroused the greatest antagonism among her subjects by a policy of reaction against the liberal laws which had prevailed. A body of white citizens of the islands finally deposed her, in January, 1893, and organized a republic, with Sanford B. Dole, an American, at its head. The new government attained the islands' annexation to the United States, and the queen was compelled to retire to her private estates in Honolulu. She became fully resigned to the new order, and in her last years was an earnest champion of the United States rule. See HAWAIIAN ISLANDS, subhead *History*.

LILLE, or **LISLE**, *leel*, FRANCE, a fortified city, capital of the department of Nord, situated on the Deule River, seven miles from the frontier of Belgium and 155 miles by rail north by east of Paris. During the

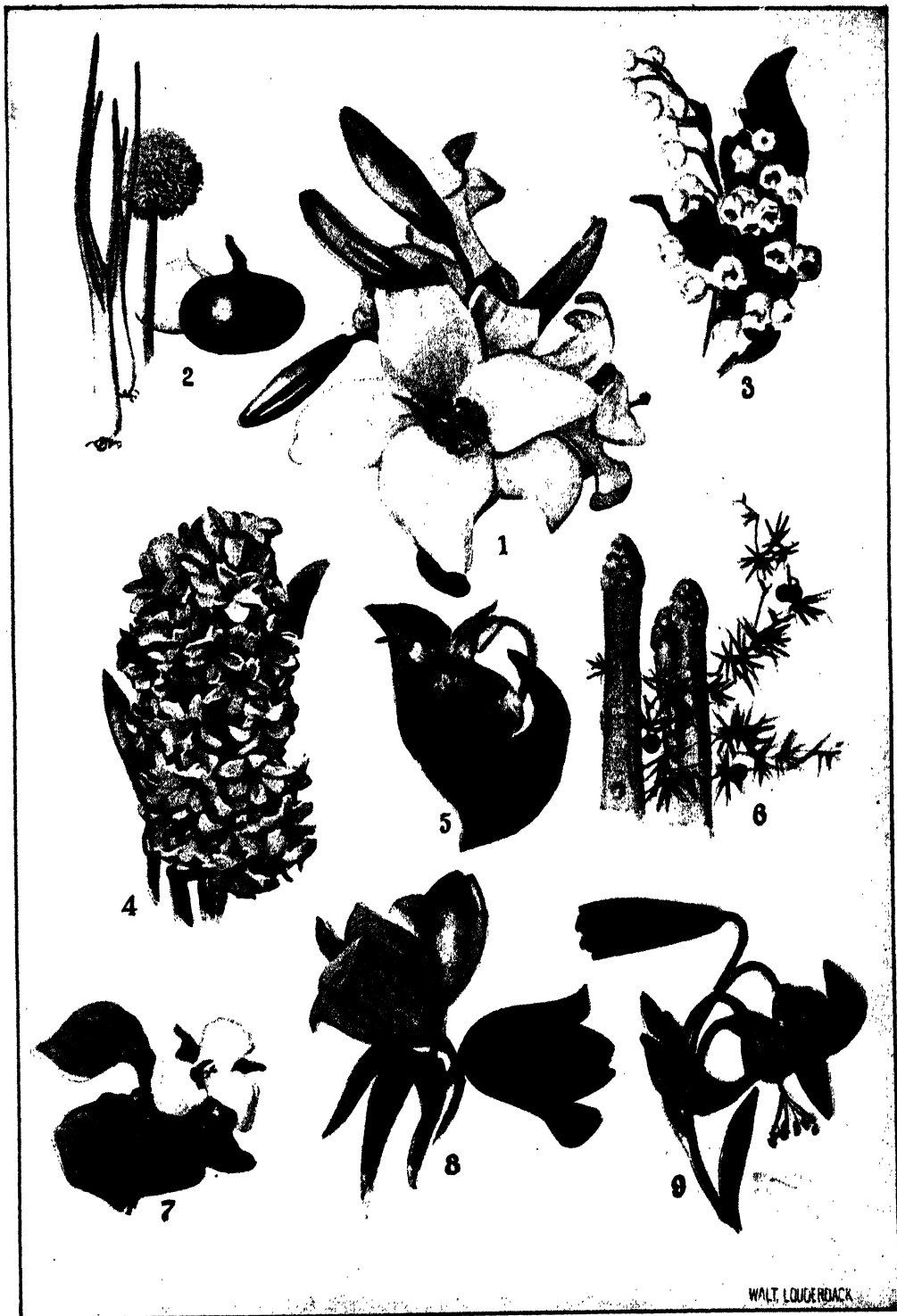
past century the city became famous as a center of the country's textile industry, and for the wide range of articles manufactured. Few other cities possess more extended facilities for the spinning of flax, the material it uses in vast quantities for the making of linen cloth, damask, table-linens, thread, laces, ribbon, and the like. It also prepares large quantities of tobacco products, and is a manufacturer of liquors. Lille is so close to Belgium that during the World War it suffered greatly from the Germanic invaders. Though the city was not severely bombarded, many fine buildings were destroyed; the town was occupied by the enemy; its citizens were forced to pay war tribute, and its industrial life was largely suspended for the years of the war.

The city dates from about 1030, in which year Count Baldwin built a wall around a collection of rude buildings that surrounded a medieval castle. Population, 1931, 201,568.

LILY, the common name of a large family of plants and also of the characteristic genus of that order. The leaves and stem are produced from a scaly bulb and bear at the summit flowers which are in many species large and elegantly formed. The typical lily has a colored perianth of six parts, either tubular with spreading divisions, bell-shaped or with re-curving parts. Many of the lilies are common in cultivation and are among the favorite plants of the gardeners, though some which are commonly known by the name of lily belong to very different families, as, for instance, the calla and the water lily.

White lilies are universally regarded as emblems of purity and innocence, and among these are the Easter, or Bermuda, lily, the Mediterranean lily, the beautiful Chinese and Japanese varieties, with their rosy or golden markings, and the small, bell-shaped lilies of the valley, of charming appearance and fragrance. The hyacinth, another small-flowered lily, is one of the earliest spring plants. The strangely named dog-tooth violet is a nodding flower borne singly on a short stem. Other familiar members of the family are the trillium, tulip and tiger lily. (See accompanying color plate.)

LILY OF THE VALLEY, a beautiful little plant of the lily family. It bears a dozen or more small, white, bell-shaped flowers on a slender stalk, which rises from between two large, dark-green leaves. Its beauty and the pleasing fragrance of the flowers make it one



SOME MEMBERS OF THE LILY FAMILY

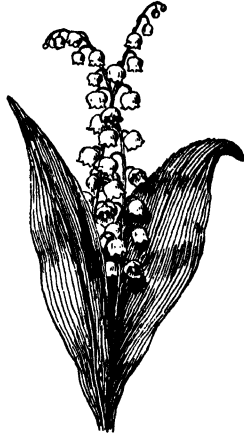
1—Easter Lily. 2—Onion. 3—Lily of the Valley. 4—Hyacinth. 5—Dog-tooth Violet.
6—Asparagus. 7—Trillium. 8—Tulip. 9—Tiger Lily.

of the most popular of cultivated plants. Under favorable conditions it spreads rapidly in rich gardens and requires very little attention. Florists force the plant to bloom at all seasons of the year, but outdoors it appears early in the spring.

LIMA, OHIO, the county seat of Allen County, seventy-two miles south of Toledo, on the Ottawa River and on the Baltimore & Ohio, the Nickel Plate, the Erie, the Detroit, Toledo & Ironton and the Pennsylvania railroads. There is an **LILY OF THE VALLEY** airport. It contains extensive railroad shops, locomotive and car works, machine shops, and manufactures steel castings, Diesel engines, enameled goods, women's garments, and has oil refineries. The Ohio state asylum for the criminal insane is located here, and it has a County Historical Society. Population, 1920, 41,306; in 1930, 42,287, a gain of 2.3 per cent.

LIMA, le'mah, PERU, the capital of the country, is situated 12° south of the equator, 500 feet above sea level, on the Rimac River, seven miles from Callao, its port on the Pacific Ocean. The city seldom receives rain, but it is troubled with dense fogs from the ocean. Among the chief buildings the most notable is the cathedral, begun in 1535. The houses are for the most part built of adobe, with plaster stuccoes. The manufactures are unimportant, but there is a considerable import and export trade through the port of Callao. Lima was founded in 1535 by Pizarro and was called Ciudad de los Reyes (City of the Kings). In January, 1881, the city capitulated to the Chileans, who occupied it for two years, and destroyed some of its treasured landmarks. Population, 1931, 281,425.

LIME, a small globe-shaped lemon, the fruit of a shrub about eight feet high. It is a native of India and China, but was introduced into Europe long before the orange and is now extensively cultivated in the south of Europe, the West Indies, Mexico and some parts of South America. The fruit is



agreeably acid, and its juice is employed in the production of citric acid and in the preparation of cooling beverages.

LIME, the oxide of calcium, produced by heating limestone, or calcium nitrate. Pure lime is perfectly white, has the properties of a strong lye, dissolves slightly in water and is not affected by heat. The ordinary quicklime of commerce is made by heating some varieties of limestone in kilns. The heating drives off the carbon dioxide and leaves the lime. The limestone is usually put in at the top of the kiln, and the lime is taken out at the bottom. This lime is not pure, but answers for most purposes for which lime is used. The best quality is obtained from marble. *Hydraulic lime* is obtained by burning limestone that contains silica and clay. When burned, these substances form with the lime a compound which hardens under water.

Lime is used for making mortar, cements, glass and numerous other commodities. It is also used in tanning, to remove the hair from skins; for a fertilizer, in the manufacture of soap and as a flux in smelting ores. Slaked lime is made by pouring water upon quicklime. Unless used immediately, slaked lime absorbs carbon dioxide from the air and becomes worthless. The limewater used in medicine is prepared by dissolving a small quantity of pure lime in water.

In Agriculture. Lime is now being used in great quantities to improve the quality of soil. There are very few acres that will not be benefited by an application of lime once or twice a year. In some parts of the Southern states, where there are few sections showing lime near the surface, the soil is very acid, and in this section five times as much lime is used as formerly.

LIME LIGHT, or OXYHYDROGEN LIGHT, a brilliant light, produced when a jet of mixed hydrogen and oxygen gas is ignited and directed on a solid piece of lime. It is commonly used in magic lantern exhibitions; and the two gases are kept in separate air-tight bags or iron cylinders, into which the gas is forced under very high pressure. From these receptacles, tubes conduct the gases to meet in a common jet. Electric light has largely superseded lime light.

LIM'ERICK, a nonsense verse having a special rhyme scheme and a sing-song meter. Anyone with a sense of rhythm and a gift for making rhymes can compose limericks. The following are typical:

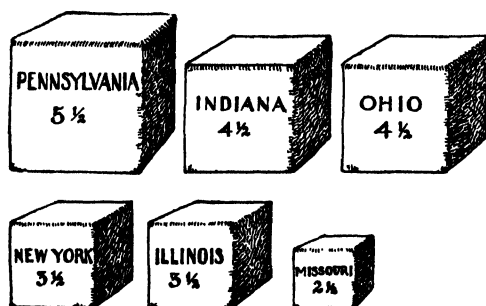
For beauty I am not a star,
There are others more handsome by far.
My face I don't mind it,
Because I'm behind it;
It's the people in front that I jar.

There was a particular bride
Who objected to eggs being fried.
Not because of the grease,
But the shocking decease
Of the poor little chickens inside.

As shown by these examples, the first two and the fifth, and the third and fourth lines of the limerick rhyme. The name is believed to have its origin in the chorus of an old song of that meter in which there is a reference to the city of Limerick.

LIMERICK, IRELAND, an Irish seaport, capital of Limerick County. It is built on both sides of the Shannon and is 106 miles southwest of Dublin. The three parts into which the city is divided are known as Englishtown, Irishtown and Newtown Pery. The industries include the curing of bacon, flax spinning and weaving and lace making. There are also distilleries, breweries, tanneries, corn mills, a large military clothing establishment and shipbuilding slips. Limerick is the leading port on the west coast of Ireland for the shipment of produce. Population, 1926, 39,448.

LIME'STONE, one of the most useful of common rocks, composed of either calcium or magnesium with oxygen and carbon. The ordinary limestone is of a grayish color and is somewhat coarse-grained, but there are many varieties, varying in color from white, as in the pure marble, to black. The pure



AVERAGE YEARLY PRODUCTION OF LIMESTONE

Figures represent millions of dollars.

limestone forms in crystals, which from their form are often called dog-tooth spar. Iceland spar is another pure variety. When changed by heat in the earth, limestone becomes marble (see **MARBLE**). Limestone

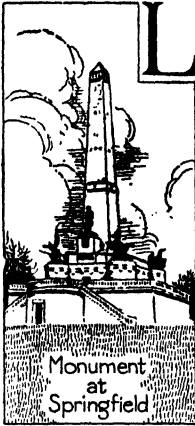
forms about three-fourths of the sedimentary rocks. It is not so hard as granite, but is strong and constitutes an excellent building stone for foundations and walls where a nice finish is not required. It is also used as a flux in smelting iron ore, in the manufacture of glass and for making quicklime. (See **LIME**; **BUILDING STONE**.)

LIMOGES, *le mohzh'*, FRANCE, capital of the department of Haute-Vienne, is situated in the central part of the country, 215 miles southwest of Paris, on the Vienne River. The principal industry is the manufacture of artistic porcelain, known as Limoges ware. About 6,000 men are employed in making this porcelain in normal years. There are also wool and cotton spinning mills, cloth factories, foundries, paper mills and extensive shoe and clog making establishments. Limoges is the seat of a bishop. Population, 1931, 92,575.

LIMON, *le mohn'*, COSTA RICA, the leading seaport of the country, on the Caribbean coast, and the eastern terminus of a short railroad which runs across the republic from coast to coast. Half a dozen lines of steamers to American and European ports make Limon a regular port of call. Nearly all the coffee grown in Costa Rica is shipped from here; there is also a good export trade in rubber and dyewoods. Population, 1934, 16,203.

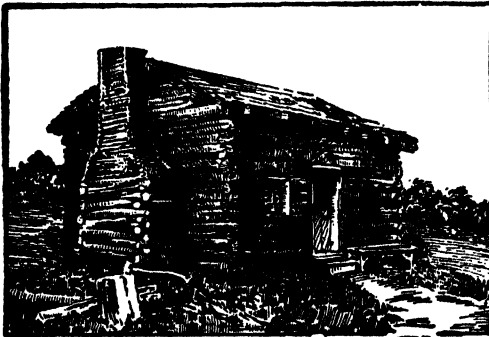
LIMONITE, a very important ore of iron, the varieties of which are bog iron ore and brown hematite. It is of a brownish color, occurs in rounded masses and is found in various parts of England and abundantly on the Continent and in America. Its location in the United States is described in the article **IRON**. See **HEMATITE**.

LIMPET, a mollusk which adheres to rocks, partly by the suction of its broad, disklike foot and partly by a sticky secretion. The common limpet is often found sheltered in a shallow bed, excavated by itself out of the rock. From this pit the limpet, when covered by the tide, makes short journeys in search of its food, which consists of seaweeds. These it eats by means of a long, ribbonlike tongue, covered with rows of hard teeth. The limpet is used as bait by fishermen and is eaten by the poorer classes of Scotland and Ireland. Some of the tropical limpets grow to be about a foot wide; such shells are often used in the homes of the people as basins, and many of them are of great beauty.



LINCOLN, *ling'kun*, ABRAHAM (1809-1865), the sixteenth President of the United States, and one of the best loved of American statesmen. To-day his countrymen honor him as the man who saved the American republic from disunion, and gave the black man his freedom. More than this, he stands as the supreme type of the democratic statesman, and the ideals which he expressed by voice and in his daily life are treasured as the greatest spiritual possessions of the American nation. By birth and by training Lincoln was in a literal sense a man of the common people. Born in a log cabin and with his entire schooling covering not more than a year, he could make no claim to aristocratic blood, to scholarship or to social prestige. He was what he was by virtue of inborn greatness.

Ancestry and Boyhood. The ancestry of the Lincoln family may be traced to an English weaver named Samuel Lincoln, who emigrated to America in 1637 and settled in Hingham, Mass. His descendants moved southward until they reached Kentucky, where Thomas, the father of Abraham, learned the trade of carpenter. In 1806 he married a girl named Nancy Hanks, and in the course of a year or two they removed to Hardin (now La Rue) County, Kentucky. On February 12, 1809, a son was born to the couple, whom they named Abraham,



LINCOLN'S BIRTHPLACE

after the father of Thomas. They were then living in a hut made of rough logs, floor-

less, and containing only the barest necessities of life. Thomas Lincoln was of a roving disposition, and after one removal in Kentucky, he took his family to a new farm in Spencer County, Indiana, where for a year they lived in a shed open to the weather on one side. Seven-year-old Abraham helped his shiftless father build a more suitable home, but even this was without doors, windows or floor when they moved into it, and it remained half finished for months. In 1818 the mother died. In that lonely region there was no one to preach the funeral sermon, and the husband himself made the simple coffin and dug the grave.

A year later, while on a visit to Kentucky, Mr. Lincoln married an old friend, Mrs. Sarah Bush Johnson. She was a widow with three children, a woman of considerable force of character, and her entrance into the family was the beginning of better things for Abraham and his sister. She made the cabin decent by comfortable furnishings, and forced her procrastinating husband to finish it without any more delay. Her stepson was encouraged to study at home, for the only schooling available in that neighborhood, which was still roamed by bears and other wild animals, was the instruction given occasionally by half-educated masters who could only read, write and "cipher to the rule of three." Abraham zealously practiced writing and ciphering at home, using in lieu of pencil and paper, a bit of chalk and the cabin walls, or a piece of wood which he whittled clean when he had covered it with marks.

Such books as he could beg or borrow he read and reread, and his library included the Bible, *Aesop's Fables*, *Pilgrim's Progress* and Weems' *Life of Washington*. How much his reading influenced him is indicated by that clear and illuminating style that characterized all of his state utterances. As time passed he gained a local reputation as a humorist, for he could tell a funny story expertly, and he had, besides, a fund of original humor that made him very human and likable. Before he became of age he had reached his great height of six feet four inches, and his awkward appearance itself was certain to arouse the mirth of his hearers.

Early Career. When Lincoln was twenty-one his father moved to Macon County, Ill., settling on a claim on the Sangamon River. The young man helped his father build a

house and break fifteen acres of land, and he also split rails for fences. In 1831, he was hired by John Hanks, a relative, to help take a boatload of goods down the Mississippi to New Orleans. This was his second (he had made a similar trip in 1828) extended journey from home, and it was of some importance in that it gave him his first view of slavery. In 1832, he enlisted in the Black Hawk War, serving from April to June, made an unsuccessful attempt to enter the state legislature as a Whig, and for a period kept a dry-goods and grocery store at the settlement of New Salem. This venture burdened him with debts which hung over him for the next fifteen years, and it was quickly abandoned. In May, 1833, he was appointed postmaster at New Salem, an office with light duties and lighter pay. During his three years' tenure of this position he studied law and politics to good purpose, and served also as deputy surveyor.

Lincoln was elected to the lower house of the state legislature in 1834 and retained his seat until 1842. In the campaign of 1836 he went on record as an advocate of woman suffrage, a movement which then was decidedly not popular. He was also forming his views on slavery, to which he was always opposed on principle. He then believed, however, that Congress could not under the Constitution interfere with slavery where it existed. Meantime he had steadily continued his law studies, and in 1837 was admitted to the bar. In 1839 he set up an office with John T. Stuart as his partner, in Springfield, the newly established capital of Illinois. Two years later Lincoln formed another partnership with ex-Judge Stephen T. Logan, but this was dissolved in 1843, when the partners became rival candidates for election to Congress. Lincoln, though defeated this time, won a Congressional seat in 1846, and served one term.

He gained no particular distinction in Congress, but he consistently voted and talked against slavery. Meanwhile, in 1842, he had married Mary Todd, daughter of the Hon. Robert S. Todd, of Lexington, Ky. At the close of his term Lincoln resumed his law practice in Springfield, becoming one of the best known lawyers of the state. An excellent account of his method as a cross-examiner will be found in Edward Eggleston's *The Grays*, in which an episode based on fact is narrated.

A National Figure. For several years Lincoln was absorbed in his practice, but the great slavery controversy, ever growing more intense, could not fail to awaken his interest in political issues. In 1854 he publicly announced his opposition to Senator Stephen A. Douglas, father of the Kansas-Nebraska Bill and of the doctrine of squatter sovereignty, and his speeches on the subject were so logical and forcible that the Whigs in the state legislature chose him as their candidate for Senator. Lincoln was not elected, but his friends, by combining with the anti-slavery Democrats, elected Lyman Trumbull, who was opposed to Douglas. In the organization of the new Republican party Lincoln stood out as the leading figure from Illinois, and in the national convention of 1856 his name was mentioned for Vice-President.

Two years later came the famous Lincoln, Douglas debates, by which, though defeated in his candidacy for the Senate, Lincoln attracted the attention of the whole country. In them he displayed not only admirable sincerity and insight, but exceptional political shrewdness, and it was not long before his name was prominently mentioned as a candidate for President. His famous Cooper Union speech in 1860 at New York made him the most conspicuous figure in Republican politics, and at the convention at Chicago, after a spirited contest with Seward, Chase, Cameron and Bates, he was nominated upon a vigorous anti-slavery platform. The campaign which followed was one of the most momentous in the history of the United States. The Democratic party, having been disorganized and divided, presented two candidates, Douglas and Breckenridge, while the Constitutional Union party, which took a neutral stand, nominated John Bell. Lincoln secured 180 electoral votes out of a total of 303, and his popular vote was 1,866,452. He lacked almost a million votes of a majority.

His election was the signal for secession by South Carolina, which had long contemplated the possibility of such a step if the demands of the slavery faction were not heeded. The action was taken in December, and South Carolina was followed by the Gulf States and within a few months by four others. Lincoln was inaugurated March 4, 1861, and in a memorable address he urged the people of all sections to unite in upholding the Union. He called to his Cabinet all



NEVADA
ADMITTED
TO THE UNION-1864



VASSAR COLLEGE
FOUNDED 1861



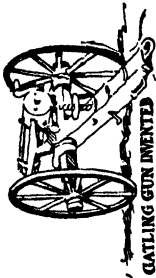
EVENTS

GRANDS PURCHASED FOR NAT. CEMETERIES-1864
ADDITIONAL TAXES TO PROVIDE FOR WAR-1864
HOMESTEAD LAW-1861
BUREAU OF AGRICULTURE FOUNDED-1862
PACER & TEL. AUTHORIZED-1862
THE ANTI-POLYGAMY ACT-1862

LINCOLN'S ADMINISTRATION



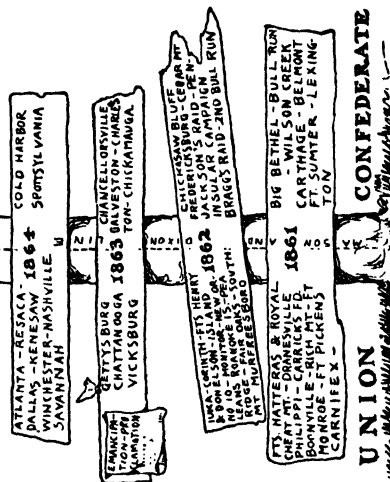
WEST VIRGINIA
ADMITTED
TO THE UNION-1863



EVENTS

FIRST ISSUE OF GREENBACKS-1862
CONSCRIPTION ACT-1863
NATIONAL BANK FOUNDED-1863
EMANCIPATION PROCLAMATION-1863
POSTAL MONEY ORDER SYSTEM EST. 1864
THE PHILADELPHIA FAIR-1864

THE CIVIL WAR



UNION CONFEDERATE

Administration of Abraham Lincoln, 1861-1865

- I. THE PRESIDENT
 - (1) Birth
 - (2) Parentage
 - (3) Youth
 - (4) As a lawyer
 - (5) Public career
 - (6) Character
 - (7) Death
- II. GOVERNMENTAL AFFAIRS
 - (1) Domestic
 - (a) First call for militia
 - (b) Blockade ordered
 - (c) Suspension of "habeas corpus"
 - (d) Financial measures
 - (e) Emancipation Proclamation
 - (f) Thirteenth Amendment
 - (g) Nevada and West Virginia admitted
 - (2) Foreign
 - (a) *Trent* affair
 - (b) *Alabama* affair
- III. THE CIVIL WAR
 - (1) Outbreak and campaign of 1861-62
 - (a) Fall of Fort Sumter
 - (b) Campaigns in the east
 - (1) Bull Run
 - (2) Army of the Potomac
 - (3) The Monitor and the Merrimac
 - (c) Campaigns in the west
 - (1) Fort Henry and Fort Donelson
 - (2) Pittsburg Landing and Shiloh
 - (3) Capture of New Orleans
 - (4) Missouri saved to the Union
 - (2) Campaigns of 1862-63
 - (a) In the East
 - (1) The Peninsula Campaign
 - (2) Jackson in the Shenandoah
 - (3) Lee's invasion of Maryland
 - (4) Fredericksburg
 - (b) In the West
 - (1) Buell-Bragg in Kentucky
 - (a) Battle of Perryville
 - (b) Stone River
 - (3) Campaigns of 1863-64
 - (a) In the East
 - (1) Chancellorsville
 - (2) Gettysburg
 - (b) In the West
 - (1) The Mississippi Campaign
 - (2) The campaign in Tennessee
 - (4) The last year of the war
 - (a) The Richmond campaign
 - (1) Battle of the Wilderness
 - (2) Sheridan's Campaign
 - (3) Fall of Richmond
 - (4) Surrender of Lee at Appomattox
 - (b) The Atlanta campaign and the March to the Sea
 - (1) Kenesaw Mountain
 - (2) Battle of Atlanta
 - (3) Franklin and Nashville
 - (4) Capture of Savannah and Charleston
 - (5) Surrender of Johnston
 - (c) Death of Lincoln

Questions

When and where was Abraham Lincoln born?

Give a brief account of his youth and the character of his education.

What public offices had he held before he was elected President?

What is meant by the privilege of the writ of habeas corpus?

Do you see any reasons why Lincoln should have desired its suspension during the war?

What was the Emancipation Proclamation?

How was it justified?

When was the Thirteenth Amendment adopted? What are its provisions?

What bombardment began the Civil War?

his principal rivals in the Chicago convention, and by every means in his power he sought to avert a civil war, which seemed inevitable. His efforts were in vain, however, and on April 14 the war began with the bombardment of Fort Sumter.

As President. Throughout the war Lincoln displayed that firmness, generosity and foresight which he had disclosed in his previous career. He was tender-hearted, patient and absolutely lacking in malice, but unyielding when it came to a question of principle. Therefore he resolutely refused to come to terms with the South until the idea of secession should be abandoned. Though he hated slavery as an inhuman and undemocratic institution, he stated publicly in August, 1862, "My paramount object is to save the Union, it is not either to save or to destroy slavery." When he became convinced that the nation could never endure half slave and half free, he decided on one of the most important steps of his career, the issuance of the Emancipation Proclamation. This decision had the effect of uniting and strengthening the anti-slavery people of the North, and it gave the government increased prestige abroad.

Though the North had been fighting the first two years of the war without signal success, there were encouraging signs of a turn in the tide in the summer of 1863, when Meade checked Lee at Gettysburg, and Grant captured Vicksburg. In November, 1863, Lincoln spoke at the dedication of the battlefield of Gettysburg, giving a short, simple address that has since become a classic of American literature. (For the full text, see GETTYSBURG ADDRESS.) These stirring events were followed by the appointment of Grant as commander in chief of the Union armies, and the Presidential and Congressional elections of 1864.

In the light of the universal esteem in which Lincoln is held to-day it seems difficult to realize that he had bitter opponents in the North. His enforcement of the unpopular draft act, his suspension of the writ of *habeas corpus*, and certain arbitrary measures which were taken to check Southern sympathizers, aroused much hostile criticism, and he was denounced as a tyrant. A strong faction also clamored for peace on the ground that the war was a failure, and on this platform the Democrats nominated McClellan in 1864. The result showed that

the people as a whole trusted Lincoln and knew that he was exercising what seemed to be autocratic power because he had the consent of the people. He was returned to office by an electoral vote of 212, against twenty-one for McClellan. The popular vote was 2,330,552 against 1,835,985. In his second inaugural address Lincoln again rose to heights of simple eloquence and to an idealism rarely equaled in American oratory, and in closing he uttered words that could come only from the mind and heart of a truly great man:

"With malice toward none, with charity for all, with firmness in the right as God gives us to see the right, let us strive on to finish the work we are in; to bind up the nation's wounds, to care for him who shall have borne the battle, and for his widow, and for his orphan—to do all which may achieve and cherish a just and lasting peace among ourselves, and with all nations."

His Death. The war by this time was inevitably drawing to a close, and on April 9, 1865, Lee surrendered to Grant at Appomattox Court House. Five days later the nation was plunged into deepest grief. Lincoln was assassinated by John Wilkes Booth, while attending a performance at Ford's Theatre in Washington, on the evening of Good Friday, April 14. He died the following morning. Southern leaders mourned his loss as that of a sincere and magnanimous opponent, and European statesmen united in conceding to him all the highest qualities of manhood and statesmanship, while the grief of the people of the North, who had considered him their truest friend—indeed, their savior—was almost too great for expression. He was buried in Springfield, Ill., and an imposing monument marks the spot. In 1922, the Lincoln Memorial, at Washington, D. C., in the form of a Greek temple of white marble, was dedicated by the Nation to his enduring memory.

Related Articles. Consult the following titles for additional information:

Black Hawk	Kansas-Nebraska
Booth, John Wilkes	Bill
Civil War in America	Political Parties in
Conscription	the United States
Douglas, Stephen A.	Squatter Sovereignty
Emancipation Proclamation	

LINCOLN, *link'on*, ENGLAND, capital of Lincolnshire, an interesting city dating from the Roman period, situated 130 miles northwest of London. The city is very imposing in appearance, being situated on a hill which

is crowned by the cathedral. Among the interesting buildings are the remains of the Norman castle, the palace and stables of John of Gaunt and the townhall. The cathedral, which is one of the finest in England, has three towers, two of which are 180 feet in height and the third 300 feet high. In the central tower hangs the famous bell called Tom of Lincoln. There are several iron foundries, manufactories of steam engines and agricultural machines, and large steam flour mills, and the city is the center of an important trade in live stock, corn and wool. It is also noted for the horse races which are held here. Under the Romans and also under the Saxons and Danes, it was a place of importance, being specially famous in the time of the Norman conquest as a place with an extensive shipping trade. Population, 1931, 66,246.

LINCOLN, ILL., the county seat of Logan County, thirty miles northeast of Springfield, on the Chicago & Alton and the Illinois Central railroads. The city is in a farming region, near extensive deposits of coal. The chief manufactures are of flour, mattresses, caskets, clay products, automobile horns, shoes, excelsior and cellulose, and the city has extensive green houses. Lincoln University (Presbyterian), affiliated with Milliken University at Decatur, is located here, and the city has a Carnegie Library, several hospitals and children's homes, including the state institution for imbecile children. The place was settled in 1835 and was incorporated in 1854. Population, 1920, 11,882; in 1930, 12,855.

LINCOLN, NEB., the capital of the state, the second city in size, and the county seat of Lancaster County, fifty-five miles southwest of Omaha, on the Union Pacific, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Missouri Pacific, and the Chicago & North Western railroads. The city has Lindbergh Field and two other airports. The most prominent buildings are the capitol, the Federal building, the courthouse, Saint Elizabeth's Hospital, Home for Dependent Children and a Carnegie Library. The city is an important distributing point. Flour, furniture, leather goods, brooms, farm implements, paints, gas engines, creamery products and clothing are the chief manufactures. Lincoln is an important educational center; here is located the University of Nebraska, Nebraska Wesleyan University,

and the state agricultural college and Union College. The site of the city was called Lancaster until made the capital and named in honor of Abraham Lincoln in 1867. Population, 1920, 54,934; in 1930, 75,933.

LINCOLN, ROBERT TODD (1843-1926), the eldest son of Abraham Lincoln, was born in Springfield, Ill., when his father was a struggling lawyer. Robert studied law at Harvard College, then joined the Union army in the Civil War and became a captain. In 1867 he was admitted to the bar, and he practiced law in Chicago until 1881, when he became Secretary of War in Garfield's Cabinet, and was continued in the office by President Arthur. From 1889 to 1893 he was minister to England. Thereafter his career was in the line of business, for he became legal adviser of the Pullman Car Company, then its president and later chairman of its board of directors.



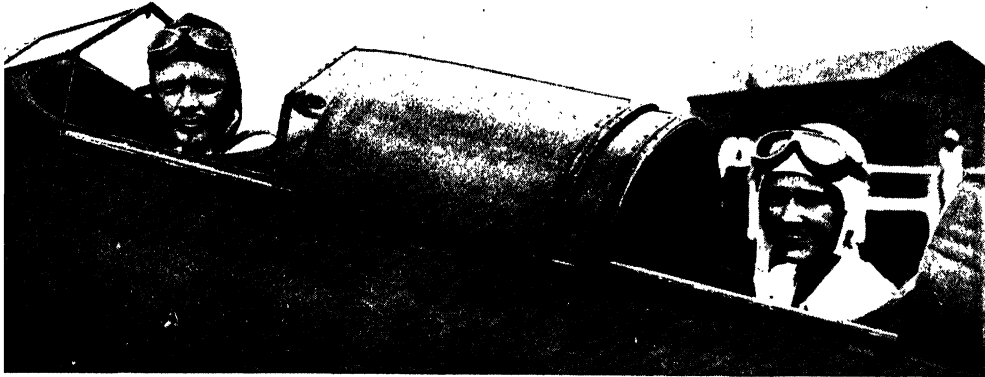
LINCOLN HIGHWAY, a public road stretching from the Atlantic Ocean across the continent—from Newark, N. J., to San Francisco. The project was first discussed in 1912, and the response from the entire country was encouraging. The plan adopted (in 1913), provided that a Highway Association should decide upon the route, and that voluntary work to provide a good road

should be done in each state through which the highway runs. The route was announced during the same year. At first, the Lincoln Highway consisted of disconnected units of township and county roads. Little by little hard roads supplanted those of every description, and in 1936 the last twenty-six miles of concrete, laid near North Platte, Neb., completed the ribbon of concrete and asphalt extending between the two oceans. The completed Lincoln Highway is officially U. S. Route 30.

The route is 3,143 miles in length. From Newark and Jersey City the direction is southeast to Philadelphia; then the road runs westward through Ohio, Indiana and Illinois, passing twenty-five miles south of Chicago, to Council Bluffs, Iowa, and Omaha, Neb. From Omaha the course is almost directly



CHARLES A. LINDBERGH



COLONEL CHARLES A. AND MRS. LINDBERGH
and map of their pathfinding tour of 1933 which took them to thirty countries
on four continents.

west through Nebraska to Cheyenne, Wyo., with a branch southward to Denver, Colo. It leaves Wyoming at Evanston, runs southwest to Salt Lake City, thence across Nevada deserts to Reno and Carson City, thence through Sacramento to San Francisco.

LIND, JENNY, (1820-1887), a famous Swedish soprano, called the "Swedish Nightingale." She was born in Stockholm and received her musical training under Garcia at Paris. She made her first appearance in London at Covent Garden in 1847 before an enthusiastic audience, and in 1850 went to the United States, where she married Otto Goldschmidt in 1852. During a two-years' sojourn in America under the management of P. T. Barnum she was received everywhere with highest admiration, and her concerts were overwhelmingly successful.

LINDBERGH, CHARLES A. (1902-), world-renowned American aviator, was born in Detroit, Mich., the son of Charles A. Lindbergh, later Congressman from Minnesota, who died in 1914. As a youth Lindbergh showed aptitude for mechanics, and at the age of twenty entered an aviation school, and then the Army School at Kelly, Texas. After two years of army training, he entered the Air Mail Service, where he remained for about two years, operating mostly between St. Louis and Chicago.

Ambitious to attempt the trans-Atlantic flight, he secured backing from friends in St. Louis, and had made for him in San Diego, Calif., a special Ryan monoplane, with a Wright whirlwind motor, which he christened *The Spirit of St. Louis*. With an entire absence of publicity, early in May, 1927, he flew from San Diego to New York, with one stop at St. Louis. Then, on May 20, the world was startled by the news that Lindbergh had left Roosevelt Field in the early morning for Paris! Vast crowds awaited him at Le Bourget Field, near Paris, where he landed in the evening of May 21, to meet the applause of the frenzied multitude. Flying alone, depending for his success on his splendid motor, and his earth-inductor compass, he covered in a continuous flight 3,600 miles in 33 hours and 21 minutes. This achievement brought him world-wide fame, decorations and honors from foreign governments, and on his return to America unexampled popular demonstrations, honors and medals from the government and from scientific societies.

His next great feat was a trip, in *The Spirit of St. Louis*, to each of the 48 states in the Union in the general interest of aviation, a journey of 22,350 miles.

On Dec. 13, 1927 at the cordial invitation of President Calles of Mexico, Lindbergh made a non-stop flight from Washington to Mexico City, arriving there at 2:40 p. m. on Dec. 14. Here he was given an enthusiastic welcome and many honors by President Calles and the Mexican people. On May 27, 1929, he was married to Anne Morrow, daughter of Dwight W. Morrow, at that time U. S. Ambassador at Mexico City.

In 1931, with Mrs. Lindbergh as co-pilot, he made a long air journey to Japan, the course being through Canada, Alaska, across the Bering Sea to Tokyo, and taking 28 days.

The kidnaping of the Lindbergh's 20-month-old son on March 2, 1932, and the subsequent finding of the boy's body—murdered, horrified the nation and caused an outpouring of sympathy for the bereaved parents.

The "Flying Lindberghs" added to their remarkable record of air travel an ambitious air journey in 1933, in which they crossed the ocean twice, visited 21 countries on four continents and covered 30,000 miles. The course took them to Greenland, Iceland, the principal cities and countries of Europe, Brazil, Trinidad and Porto Rico. The trip, made in the interest of Pan-American Airways, was made leisurely in about five months—from July 9 to Dec. 15, without a mishap.

In 1935, Col. Lindbergh appeared in a new role, that of a research biologist. At the Rockefeller Institute, in collaboration with Dr. Alexis Carrel, Nobel Prize winner, he developed an artificial heart and lungs that make possible the revival and growth of entire human organs outside the body.

In 1935, after the conviction of the kidnapper of their son and prior to the date of his execution, the Lindberghs took refuge in England, to secure privacy and to protect their second son from possible harm.

LIN'DEN. See **BASSWOOD**.

LINEN, a cloth made of the fiber of flax, celebrated for its durability, luster and strength. Among the linen fabrics are lawn, cambric, dimity, damask, dress linens, sheeting, toweling, crash, duck and canvas. Beautiful laces and coarse twine and rope, the choicest linen tablecloths and the strong fabric that composes the sails of ships all

come from the same valuable fiber (see **FLAX**). During the World War huge quantities of linen were used as wings for aeroplanes.

Linen was known to the ancients, for the cloths in which the Egyptian mummies are wrapped give evidence of its early and extensive manufacture in Egypt. The Greeks learned how to make it from the Egyptians, and the Romans from the Greeks. In the Middle Ages linen was made extensively in all parts of Europe and especially in Italy, Spain, Flanders and France. The Flemish weavers introduced it into England. The soil of France is especially adapted to the growth of flax, and the French are celebrated for the superiority of their lawns and cambrics. Belgium, Holland and Ireland are close rivals and have very fine products. The United States did not begin to manufacture linen until the eighteenth century, and the industry has been confined chiefly to the making of toweling, thread and twine. In comparison to cotton, the American linen industry is of minor importance. See **WEAVING**.

LING, PEHR HENRIK (1776-1839), a Swedish poet and teacher of gymnastics. He was a great traveler through Germany and France, and after teaching fencing at Karlberg he settled in Stockholm and established there a school of gymnastics. While here he developed a system of exercise which is still used in some countries and is known as the *Swedish movement cure*. As a patriotic poet he enjoyed a high reputation, especially from his dramatic works.

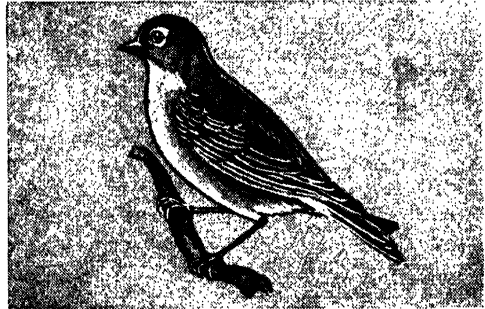
LINIMENT, in medicine, an application to be rubbed into the skin for stimulating the tissues and relieving pain. Typical preparations of this nature include a mixture of soap, camphor and spirits of rosemary, used for sprains and bruises; carron oil, a preparation of linseed oil and limewater, applied to burns; and camphor liniment, a standard sprain remedy.

LINNAEA, *lin ee'ah*, a delicate little evergreen, of the honeysuckle family, with creeping stems. It is found in woods and in mountainous places in northern countries, including North America as far south as Maryland. Two beautiful, drooping, fragrant, bell-shaped pink flowers are borne on each flower stalk. It was named for the naturalist Linne.

LINNE, *leen nay'*, KARL VON (1707-1778), commonly called *Linnaeus*, a great botanist

was born at Rashult, Sweden. He showed an early interest in plant life, but because of poverty was unable at first to go to school; later, through the assistance of a friend, he entered the University of Lund, where his botanical tastes were encouraged. In 1728 he removed to Upsala, where he undertook the supervision of the botanic garden. Aided by the Academy of Sciences at Upsala, Linné made a journey through Lapland, the result of which was shown in his *Flora Lapponica*. After he went to the University of Harderwyk, in Holland, and took the degree of M. D. While visiting Leyden he published the first sketch of *Systems of Nature and Fundamental Botany*. One of his most important works is *Species of Plants*. After traveling in England and Paris, he settled in Stockholm as a physician. He became professor of medicine at Upsala in 1741, and then of botany and natural history. The great merit of Linné as a botanist was that he arranged plants on a simple system of sexual relationship and prepared the way for the more natural and satisfactory classification which has superseded the Linnaean system. Linné is considered the originator of modern systematic botany and zoology.

LIN'NET, a small singing bird of the finch family, popular as a cage bird in Europe. It is one of the commonest of British birds and



LINNET

breeds in firs and low bushes. The name linnet is given to a number of different species, one of which, the *redpoll*, is found both in Europe and the United States.

LINO'LEUM, a preparation of linseed oil with chloride of sulphur, by which it is rendered solid and useful in many ways. When rolled into sheets it is used as a substitute for india rubber or gutta-percha; dissolved, it is used as a varnish for waterproof textile fabrics, table-covers, felt carpets and

the like; as a paint it is useful both for iron and wood and for ships' bottoms; as a cement it possesses some of the qualities of glue; vulcanized or rendered hard by heat, it may be carved and polished, like wood, for moldings and knife handles; and mixed with ground cork and pressed upon canvas, it forms floor cloth.

LIN'OTYPE, a typesetting machine, with a keyboard on the typewriter principle, though larger, in general use throughout the world. It casts its own type in solid lines as they are set, and its case carries matrices instead of types. The matrices are brass molds used in casting the type. As the operator fingers the keyboard, the matrices called for are set in order. When a line has been set, the machine moves it automatically to the casting apparatus, where the words are properly spaced, and the matrices are filled with melted type metal, casting the type into a solid line. This is then automatically set in the stick in its proper place, and the matrices are returned by a lever arm to the case, where by means of an automatic arrangement they are distributed to their proper channels. Each matrix has a number of nicks on the back, and these are used in distributing. They allow the matrix to fall into its proper channel and prevent it from falling into any other. The operator pays no attention to the casting, the placing of the type in the stick or the distribution of the matrices, the machine performing all of these operations automatically.

The linotype is the invention of Mr. Ottmar Mergenthaler, of Baltimore, who spent over twenty years in completing it, but died in poverty, as he permitted others to exploit his invention. By its use one operator can do the work of about eight men working by hand. By using different cases of matrices, more than one style of type can be set by the same machine. The disadvantage of this machine is that when an error is made, it can be corrected only by recasting the entire line.

LINSEED, the seed of the flax plant. Though this plant yields a fiber from which valuable linen fabrics are made, in the United States the greater part of the crop is cultivated for the seed (see **FLAX**). The two products of linseed are linseed oil and linseed meal.

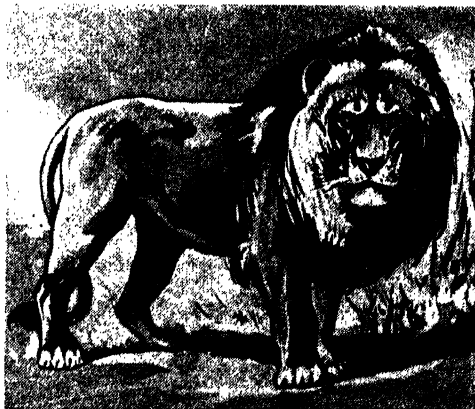
Linseed Oil is obtained by extraction with such solvents as naphtha, and by pressure

accompanied by heat. The former process is the more satisfactory. The oil is used in paints and varnishes, and in the manufacture of oilcloth and linoleum.

It is placed on the market in two forms, *boiled*, or *drying*, oil, and *raw* oil. The boiled oil contains a small quantity of oxide of lead, which causes it to dry quickly. It is the kind used in the manufacture of paints and varnishes. When pure, linseed oil is colorless, but the commercial grade is usually of dark amber hue. Its taste and odor are disagreeable.

Linseed Meal is the product left after oil is separated from the seed. It appears first in the form of hard cakes, which are ground into meal. Linseed meal is used chiefly as a food for cattle and horses. It contains considerable protein, and should be given only in small amounts because of its richness.

LI'ON, a wild animal belonging to the cat family, celebrated for its strength and ferocity. The large head, flashing eye and heavy mane, characteristic of the male, give it a regal appearance that is reflected in the name *king of beasts*. The voice of the creature is a mighty roar, and is probably the loudest call among animals. By nature the lion is less ferocious than the tiger, and is disinclined to attack man, but when angered or driven by hunger, it becomes fierce and terrible; when roused is a most dangerous adversary.



THE MALE LION

The lion is one of the largest members of the cat family, which includes the jaguar, lynx, leopard, puma and tiger. A large male lion is three feet high and ten feet long from head to tip of tail, and weighs 500 pounds.

It is distinguished by its tawny or yellow color, tufted tail and, in the male, full flowing mane. When the male is three years old its mane begins to grow; at six or seven years the lion is full-grown, and at about twenty-two it is feeble and decrepit.

Lions make their lairs in hidden caves, dense thickets, brushwood and other secluded places. They hunt their prey at night, attacking antelopes, zebras and other wild animals, if these are available; in regions where wild game is scarce they seize camels, cattle, ponies, goats, etc. The young are born in the spring, and the whelps, usually three in number, begin life with their eyes open. They are given tender care by both parents until able to take care of themselves.

Lions are found at large only in Africa and parts of Central and Western Asia, but long years ago they were common in Europe and in many parts of Asia. To-day there are none in Asia Minor, Egypt or Arabia, and there are few left in India. They thrive in captivity, and are always a source of interest in "zoos" and menageries. Trick lions are commonly seen, as these animals can be trained to go through some very interesting performances. The trainer can at no time with safety be off his guard, for the lion never loses his savage nature, and if his temper is aroused he is liable to tear his captor to pieces.

LION OF LUCERNE, *lu surn'*, the name given to a famous piece of carving in Lucerne, Switzerland, which commemorates the heroism of the Swiss Guards who were killed while defending the palace of the Tuileries, in Paris, on August 10, 1792. The carving, chiseled in solid rock out of the side of a grotto, is the work of the Danish sculptor Thorwaldsen. It represents a dying lion, and is twenty-eight feet in length.

LIPARI ISLANDS, a group of islands comprising less than fifty square miles, in the Mediterranean, north of Sicily, a part of a province of Sicily. They are of volcanic origin, and two of the islands, Stramboli and Vulcano, have active volcanoes. There are hot springs and pumice stone quarries here. Population, 1931, about 21,000.

LIPPI, FILIPPO (1406-1469), a Florentine painter. He was a pupil of Masaccio, and his works are noted for their warm, transparent color and expression of human sympathy. He is considered the first representative of the Florentine school of painters, and his greatest

works now existing are the frescoes in the Cathedral of Prado, which were executed between 1452 and 1464. These frescoes represent scenes from the lives of John the Baptist and Saint Stephen. Lippi's son, Filippo, usually known as Filippino, inherited his father's talent and continued his work with marked distinction. For further details concerning Lippi, see the article PAINTING.

LIP READING, the art of interpreting what is said by watching the movements of a speaker's lips. This method of reading speech is now taught in the majority of schools for the deaf, and is rapidly replacing the older sign language (see DEAF AND DUMB). Those who wish to take it up privately should secure, if possible, an expert teacher, but if this is not practicable much can be accomplished by means of an instruction book and the use of a mirror for practice.

The upper teeth constitute the point at which the vision should be directed. In the beginning the teacher repeats many times phrases or short stories, and the pupil watches the lip movements until he can interpret them. More complicated exercises follow, and the various motions corresponding to different sounds are learned. As practice work the pupil watches his own lip movements in a mirror. Lip reading has proved a wonderful benefit to many who are totally deaf, and there are those who have become so skilled in the art that their deafness is almost unnoticeable. Physicians generally advise the partially deaf to take it up if there is evidence that their infirmity is gradually becoming worse. Information on this subject may be obtained from the Volta Bureau, Washington, D. C.

LIPTON, THOMAS, Sir (1850-1931), the world's greatest tea-plantation owner and a British yachtsman of international reputation. He was born in Scotland, worked as laborer and clerk in the United States when a boy, then returned to his home and opened a small grocery store. He prospered and within a few years owned many stores, then became interested in tea, coffee and rubber plantations in India and Ceylon. He was always an enthusiastic sailor, and made several attempts to win the historic yachting trophy, the *America* cup, with his boats, *Shamrock I*, *Shamrock II*, *Shamrock III* and *Shamrock IV*, but without success. The last race was in 1930.

LIQUID, that form of matter which, if placed in any gas with which it does not mix, as air, forms a spherical drop; or, if placed in a hollow solid vessel, takes the shape of the vessel, maintaining a constant volume.

LIQUID AIR. By lowering the temperature of air to 220° below zero F., or 140° below zero C., then subjecting the air to a pressure of 585 pounds to the square inch, it can be changed to a liquid. For a number of years physicists attempted to liquefy air, without success, because they could not reduce the temperature sufficiently, but when this difficulty was overcome, it was found that air could be liquefied more easily than some other gases. When exposed in a glass vessel, liquid air absorbs heat rapidly from certain objects and boils violently until it has evaporated. The nitrogen part of air evaporates more rapidly than the oxygen. Notwithstanding its exceedingly low temperature, liquid air can be frozen. It instantly freezes all substances immersed in it. Meat is frozen so hard as to become brittle, and even iron is affected by the low temperature. Liquid air is so much colder than ice that when placed in a tin vessel and set upon a cake of ice it boils rapidly. For a time it was supposed that great commercial advantages would be derived from liquid air, but until now its use has been limited to freezing substances and as a source of oxygen, nitrogen, and argon.

LIQUID, *lik'wid*, FIRE, a modern successor to a war device of the ancient Greeks. Liquid fire in its present-day sense was invented and used by the Germans in the World War (1914-1918), and it proved a terrible weapon. It was composed of a mixture of gasoline and pitch (or other coal-tar product) and was projected toward the enemy, with a favoring wind, from a flammenwerfer (flamethrower). This device possessed two barrels; from the lower the mixture was forced through a nozzle, and it was ignited automatically from the other barrel. The flaming stream, which was unbearably hot, could be used with deadly effect when the enemy was at close range. Thick gray smoke and a nauseating smell added to the agony endured in a liquid fire attack.

LIQUIDAM'BAR, a genus of handsome trees, with lobed, shining leaves and catkins, or globular heads of flowers. The fragrant liquid resin, called oil of liquidambar and copal balsam, is obtained from the sweet

gum, or liquidambar, of Mexico and the United States.

LIQUORS, *lik'kurz*. See DISTILLED LIQUORS.

LIRA, *le'rah*, a silver coin of Italy, the monetary standard of the country, as is the franc in France or the dollar in the United States. Formerly worth 19.3 cents, its present value is about 5 cents.

LISBON, *liz'bon*, PORTUGAL, the capital and chief seaport of the country, beautifully situated on the right bank of the Tagus River, about seven miles from the Atlantic Ocean. The old town is built in the form of an amphitheater, on a series of hills, and presents a most picturesque appearance, although it has narrow, ill-paved streets. The new part has broad, well-kept streets and open squares. There are in Lisbon several royal palaces, an old Moorish citadel and numerous notable churches and convents. The exports consist chiefly of wine, oil, cork, fish and fruit, and the principal imports are cotton, cotton tissues, sugar, grain, coal, tobacco and coffee. The principal manufactures include cotton textiles and gold and silver wares.

Lisbon is a place of remote antiquity, its earliest name being Olisipo. In 1755 it was visited by an earthquake, which destroyed the greater part of the city and caused the death of about 40,000 of its inhabitants. It was taken by the French in 1807, but resisted an attack by Massena in 1809. Population, 1930, 594,390.

LISGAR, LORD, SIR JOHN YOUNG (1807-1876), an English diplomat and statesman, born in Bombay, India, and educated at Eton and Oxford University. He prepared for the practice of law, but while still a student was elected to the House of Commons, where he continued to represent his constituency for nearly twenty years. In 1852 he was appointed Chief Secretary for Ireland, and three years later, Lord High Commissioner for the Ionian Islands. In 1860 he became governor of New South Wales, and in 1868 succeeded Lord Monck as Governor-General of Canada, holding the position until 1872. During his administration in Canada, Manitoba and British Columbia entered the confederation, the Treaty of Washington was signed, and plans for the construction of the Canadian Pacific railway were perfected. In 1870 Sir John was created Baron Lisgar. When he left Canada

he retired to his estates in Ireland, where he died. (For portrait, see article GOVERNOR-GENERAL.)

LIS'TER, JOSEPH, Sir (1827-1912), an English surgeon, born at Upton, Essex. From 1860 to 1869 he was professor of surgery in Glasgow University; from 1869 to 1877 he was professor of clinical surgery in the University of Edinburgh, and in the latter year he was appointed to the corresponding chair in King's College, London. His name is especially connected with the successful application of the antiseptic treatment in surgery, which inaugurated a new era in this branch of medical science. He published various papers on surgical pathology. Listerine, a soothing, healing lotion, was named for him. See SURGERY.

LISZT, *list*, FRANZ (1811-1886), an eminent pianist and composer born in Hungary. He made his first public appearance in his ninth year, studied in Vienna and Paris, and produced an opera at the age of fourteen. In 1861 he went to Rome, where he joined the priesthood, and in 1870 he became director of the Conservatory of Music at Pest. His chief works are the *Faust* and *Dante* symphonies and the oratorios, *Saint Elizabeth* and *Christus*; but his fame largely rests upon his ability as a pianist, for he has been unhesitatingly accorded first place among the world's artists in that field.

LIT'ANY, a solemn supplication to God that he will turn aside his anger. Of the three litanies in the Roman Catholic Church, the "litany of the Saints" is the only one having a place in the service books of the Church. The other two are the "Litany of the Name of Jesus" and the "Litany of Loreto." The most common form in the early Church was "Kyrie eleison" (Lord have mercy), given by the priest, to which the congregation responded "Christe eleison." The use of the litany in Latin churches is required only on Rogation Days, or the Monday, Tuesday and Wednesday before Ascension Day, and on Saint Mark's Day, April 25. It is common, however, on special occasions, as ordinations and consecrations, and is ordered in time of famine, pestilence, war or like calamities.

LITER, *le'tur*, the standard measure of capacity in the metric system of weights and measures. The liter is a cubic decimeter, that is, it contains about 61.028 English cubic inches. It is equivalent to about one English

quart, or, more exactly, to .23 of a gallon. See METRIC SYSTEM.



LITERATURE. We use the word *literature* very commonly, and yet if we were called on to give a definition of it, many of us might find the question embarrassing. The simplest way out of the difficulty would be to say that literature means everything that has been set down in writing and preserved. That is, English literature would include everything that has been produced in the English language from the Scripture commentaries of the earliest ecclesiastics to the last feeble volume of verse which has just come from the press. However, such a definition is too wide really to be accepted, and the term "literature" has come to mean a much more restricted thing. When a professor of mathematics turns over eagerly the leaves of a new technical work on differential calculus, he is not reading literature; when a boy, hidden behind the barn, devours cheap tales of the lives of bandits, he is not reading literature. As distinguished from what is merely technical, from what is harmful, or from what is of a merely passing interest, literature is the body of writings which by reason of beauty of form or beauty or interest of content make a continued appeal to the higher emotions or the intellect of men. Even when we have narrowed the definition this much it is very wide, embracing as it does poems, dramas, essays, biographies, histories, novels, orations and countless writings which cannot be classified under any of those heads. Wherever we find it, that which brightens, uplifts, encourages, is literature.

English Literature. The beginnings of English literature may be said to lie in the songs of the Saxon gleemen, who encouraged their warriors in battle and enlivened their victorious feasts with praise of the heroes; the most important relic of this old literature is the epic *Beowulf*. There was an early literature of the Celts, light and poetic, filled with delicate sentiment and humor that the Saxon tongue did not show. Very little of it remains, but it exerted a strong influ-



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PROMINENT AMERICAN AUTHORS



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JOHN GALSWORTHY



Photo by U. & U.

JOHN MASEFIELD



THOMAS HARDY

EMINENT BRITISH AND CANADIAN AUTHORS

ence on Anglo-Saxon literature. The first poem that really originated in England is Caedmon's *Paraphrase*, a metrical version of parts of the Bible, which was composed about A. D. 670. Because of his numerous translations of Latin into English, the name of "Father of English Prose" has been given to King Alfred, though his prose was by no means the first. The growth of the literature was slow, and it was not until the end of the fourteenth century that the *Vision of Piers Plowman*, the first great poem, was written. At about the same time John Wycliffe was translating the Bible into English. Geoffrey Chaucer, the "Father of English Poetry," was born about 1340, and his *Canterbury Tales*, a collection of stories ostensibly told by pilgrims who met at the Tabard Inn and journeyed to Canterbury, are still filled with beauty and charm for the reader who has skill and patience to study them sufficiently to understand the language used by the old poet.

With Chaucer may be said to have closed the age of preparation in literature, for thereafter the development was steady and rapid. After the introduction of printing in the fifteenth century, books multiplied with great rapidity; but, nevertheless, it was not until the time of Queen Elizabeth, in the latter half of the sixteenth century, that English literature took the position of first importance in the world. Then, awakened as the nation was by the wonderful discoveries and explorations in America, by scientific discoveries and by the great victories of the navy, England produced a group of writers of a high order. Thoughtful essays, filled with the new science and sparkling wit of the day; poetry, glowing with the love of nature and splendid with beautiful phrases, and marvelous dramas, never since equaled, were poured out in those fifty resplendent years. The period is said to close with the accession of James I in 1603, though Shakespeare, the greatest genius of the period, lived until 1616.

During the Puritan Age, which closed in 1660, England changed its literary style completely and sacrificed the love of the beautiful to the search for truth. Milton, the one great literary man of his age, shows in his poetry the changes that were taking place, for he began his long literary career under the first Charles and did not complete his greatest poem till, old and blind, he lived

alone after the Revolution had done its work. With the restoration of Charles II, the literature of England quickly responded to French influences and rapidly developed into the striking brilliancy and beauty of the age of Queen Anne (1702-1714), which produced Defoe, Swift, Addison and Pope. It was during this time that *The Spectator*, chiefly the work of Joseph Addison, made its appearance. Then followed a remarkable development of the novel, represented by the works of Goldsmith, Richardson and Fielding; a new spirit in poetry also became apparent.

The early part of the nineteenth century, the period of Romanticism, saw a marvelous development of the new order of poetry, and the production of imaginative verse of a high order. The great poets of the period were Burns, Coleridge, Wordsworth, Shelley, Keats, Byron and Southey. Lamb and Scott were eminent prose writers. Then came the Victorian Era, which produced Carlyle, Macaulay, the Brownings, Tennyson, Dickens, Thackeray, George Eliot and other famous writers.

A brilliant group of novelists, poets, dramatists and essayists followed the great Victorians, and made notable the first quarter of the twentieth century. Among these gifted writers may be mentioned Arnold Bennett, H. G. Wells, Mrs. Humphry Ward, A. Conan Doyle, Joseph Conrad, William De Morgan, Rudyard Kipling, G. K. Chesterton, Bernard Shaw, James Barrie, Henry A. Jones, John Galsworthy, Rupert Brooke, Alfred Noyes, John Masefield and William B. Yeats.

American Literature. In early colonial days there was little that could be called really American in the writings of the literary men of this country, but, beginning with the excellent prose of Franklin's *Autobiography*, a new life appeared, though it was not until the early part of the nineteenth century that poetry, essays and fiction of a characteristic American type became common. Irving, Bryant, Cooper and Poe were the greatest writers of the early period. Before, during and after the Civil War lived a remarkable group of poets, essayists and novelists, the greatest America has ever known. Most of them resided in and around Boston and were deeply moved by new ideas in religion and by the slavery agitation that was then at its height. Representative of

this group are Emerson, Holmes, Lowell, Longfellow and Whittier. Since the Civil War numerous writers, in both prose and poetry have kept the level high, and there have appeared many of enduring fame, such as Howells, Mark Twain, Riley, Field, Bret Harte, O. Henry and Churchill. (See outline at close of article.)

Greek Literature. The literature of the Greeks has served as a model and inspiration to writers of every age and race. Its poetry is musical and finished, its essays are refined, thoughtful and polished, and its oratory is noble and eloquent. Its great epic, Homer's *Iliad*, is still studied in every school where the language is taught and still has its influence on the writers of to-day. It is a storehouse of allusions which are in constant use, and without a knowledge of it reading becomes difficult.

Greek lyric poetry was connected with, in fact was, almost a part of Greek music. The Greeks employed a great variety of meter and developed many forms of poetry that are still imitated. To their historians, notably Herodotus, Thucydides and Xenophon, we are indebted for much of our knowledge of the earlier peoples. In philosophy, Greece had no rivals, and in one way and another its famous trio, Socrates, Plato and Aristotle, foreshadowed the greater part of what has been perfected in our times.

Greek orations were among the greatest ever delivered, and if we consider their effect upon the people they must be called the greatest. In their modern form they have served as models for many an orator, who looks to Demosthenes as his guide. But the greatest triumph of Grecian literature, if we except the *Iliad*, lay in the drama. Both tragedy and comedy had their origin in Greece in the worship of the god Bacchus, and for beauty, strength and passion, the productions of the old Athenians still rank among the greatest in the world. The greatest writer of comedy was Aristophanes; of tragedy, Sophocles, Euripides and Aeschylus.

Latin Literature. Scarcely behind the Greeks were the Romans, though the latter were in a sense imitators and really originated few things. Both their prose and poetry, however, have influenced the literature of modern Europe more forcibly than that of Greece and have entered more deeply into the education of mankind than those of any other nation. There was a period of crude begin-

nings, in which the language was taking form. During this time little was produced that has remained alive. Following this came a period of improvement, which lasted to about 84 B. C., during which time there were many great literary names in Rome, chief of which was Cato. From 84 B. C. to A. D. 14 is usually known as the Golden Age, in which lived Vergil, Caesar, Cicero and Livy. From the death of Augustus to the time of Hadrian is often called the Silver Age, the age of Juvenal, Tacitus and Pliny. From then till the fourth century there was a falling off in literary power, and after the fourth century there was a distinct decline that finally resulted in the extinction of Latin as a living language.

Italian Literature. For Italy the fourteenth century was the most brilliant period, although it was the first in which the modern Italian tongue was used. Latin still remained the scholarly language, but a trio of great writers used the language of the people, and the beautiful poems and perfect prose produced by these men made Italy for a time the most prominent literary nation in Europe. The three were Dante, Petrarch and Boccaccio. Ariosto and Tasso flourished in the sixteenth century. By the latter part of the sixteenth century other nations had taken the lead, and thereafter the influence of Italy became of less importance. Within recent years such notable writers as the historian Ferrero and the poet D'Annunzio have gained wide fame. It should be remembered that Italy gave the sonnet to poetry, and that the imagery, metrical forms and materials for plots in both drama and story used by such writers as Chaucer, Spenser and Shakespeare came directly from the Italians or were the fruitful result of their art.

French Literature. It was not until the sixteenth century that France was moved by the awakening spirit that had caught the souls of the English, but then little tales and polished essays were produced in great number, as the characteristic feature of the age. Montaigne ranks as the originator of the modern essay. The Golden Age of the French appeared at the end of the seventeenth century, the epoch of Louis XIV. Then French art really dominated Europe, though the full effect of its influence was not felt until some time later. Dramatists, essayists, wits and poets all are represented among French men of genius, among whom may be mentioned

Corneille, Racine, Molière, Lafontaine and Fenelon. The eighteenth century produced many brilliant men, and established France firmly in the high position it occupies today. Among the writers of that time are Montesquieu, Voltaire and Rousseau. Of later writers there have been many in every field of literature, including Hugo, Dumas, Guizot, Bergson and Rostand.

German Literature. The literature of Germany did not attain world-wide importance until modern times, though its poems and tales date back beyond Charlemagne. After the country recovered from the effects of the Thirty Years' War, which closed in 1648, a new spirit of national consciousness came into being, and was reflected in the poetry of Klopstock and Wieland and in the drama of Lessing. Then followed that famous group of authors who have given German writings a commanding place in the world's literature—Goethe, Schiller, Kant, Fichte, Schelling, Uhland, the Brothers Grimm, Heine and others. Of more recent date are the dramatists Hauptmann and Sudermann.

Related Articles. Below are given various topics treated in these volumes, which should be read in connection with the article on literature:

GENERAL		
Allegory	Dictionary	Melodrama
Alliteration	Drama	Meter
Anagram	Edda	Minnesingers
Anthology	Elegy	Minstrel
Augustan Age	Epic	Novel
Autograph	Epigram	Ode
Ballad	Essay	Oration
Bard	Fable	Poet Laureate
Belles-Lettres	Farce	Poetry
Bible	Fiction	Reading
Bibliography	Figures of	Romance
Biography	Speech	Romanticism
Blank Verse	Folklore	Sagas
Book	Idyl	Satire
Burlesque	Irony	Skalds
Charade	Legend	Sonnet
Comedy	Lytic Poetry	Tragedy
Concordance	Manuscripts	Troubadour
Debate	Masque	Trouvere
	Mastersingers	
LITERARY REFERENCES		
Aeneid	Don Quixote	
Aesop	Evangeline	
Aladdin	Galahad, Sir	
Alice's Adventures in Wonderland	Godiva, Lady	
Ancient Mariner	Grimms' Fairy Tales	
Arabian Nights	Hamlet	
Autocrat of the Breakfast Table	Hiawatha	
Becky Sharp	Iliad	
Ben Hur	Junius Letters	
Beowulf	Lake School	
Biglow Papers	Les Miserables	
Bluebeard	Macbeth	
Camille	Merchant of Venice	
Canterbury Tales	Mother Goose	
Charge of the Light Brigade	Nibelungenlied	
Cid, The	Odyssey	
Cinderella	Paradise Lost	
Courtship of Miles Standish	Poor Richard's Almanac	
Don Juan	Rip Van Winkle	
	Robinson Crusoe	
	Vedas	

BIOGRAPHY

These volumes contain biographies of the most important writers mentioned in the general article. See also special lists accompanying the articles Drama, Essay, History, Novel, Poetry.

How to Read Literature. It is not necessary to emphasize here the important part which good literature plays in the building of character and of intellect. But it is not enough that one should read; one should read systematically, with a purpose. This does not mean that all the works of the eighteenth century should be read before those of the nineteenth are touched, or that essays should be read one year and dramas the next. But there is an immense gain in connecting reading in some way with what has gone before. To follow, for instance, the growth of the English novel through the two centuries and a half of its existence will give one a more real knowledge of that most popular of all forms of literature than years of scattered novel-reading can do.

Outlines. The outlines on English and American literature which follow are intended not only to give a general comprehensive view of the literature of those two countries, but to make possible some such systematic plans of reading. In connection with the articles on the various outlines and on the various forms of literature given in these volumes, these outlines may be used in many ways to suggest schemes of reading:

ENGLISH LITERATURE

I. Early Literature

1. Before Chaucer
 - a. Poetry
 - Beowulf
 - Caedmon's Paraphrase
 - Vision of Piers Plowman
 - b. Prose
 - The Venerable Bede
 - King Alfred
 - John Wyclif
2. Geoffrey Chaucer
 - Legend of Good Women
 - The Canterbury Tales

II. Elizabethan Age

1. Poets and Their Principal Works
 - a. Non-Dramatic
 - Edmund Spenser. 1552-1599
 - Shepherd's Calendar
 - Faery Queen
 - b. Dramatic
 - William Shakespeare. 1564-1616
 - The Merchant of Venice
 - Hamlet
 - Macbeth
 - Ben Jonson, 1573-1637
 - Every Man in His Humor

Selections for Memorizing

We sow a thought and reap an act; we sow an act and reap a habit; we sow a habit and reap a character; we sow a character and reap destiny. —*Thackeray.*

The only reason we don't see good things everywhere is because we haven't good eyes.
—“A Fool of Nature,” *Julian Hawthorne.*

Ah, faithful to Little Boy Blue they stand,
Each in the same old place,
Awaiting the touch of a little hand,
The smile of a little face.
And they wonder, as waiting these long years through,
In the dust of that little chair,
What has become of our Little Boy Blue
Since he kissed them and put them there.

—“Little Boy Blue,” *Eugene Field.*

Then here's to our boyhood, its old and its gray!
The stars of its winter, the dews of its May!
And when we have done with our life lasting toys,
Dear Father, take care of Thy children—The Boys.

—“The Boys,” *Oliver Wendell Holmes.*

“With malice toward none, with charity for all; with firmness in the right, as God gives us to see the right, let us finish the work we are in—to bind up the nation's wounds; to care for him who shall have borne the battle and for his widow and his orphans; to do all which may achieve and cherish a just and lasting peace among ourselves and with all nations.

—From Second Inaugural Address: *Abraham Lincoln.*

In battle or business, whatever the game,
In war or in love, it's ever the same;
In the struggle for power, or scramble for pelf,
Let this be your motto, “Rely on yourself.”

—*Saxe.*

Our greatest glory consists not in never falling, but in rising every time we fall.

—*Emerson.*

My son, observe the postage stamp! Its usefulness depends upon its ability to stick to one thing until it gets there.

—*Josh Billings.*

But chief of all,
Oh loss of sight, of thee I must complain!
Blind among enemies, O worse than chains,
Dungeon, or beggary, or decrepit age!
Light, the prime work of God, to me's extinct,
And all her various objects of delight
Annulled, which might in part my grief have eased;
Inferior to the vilest now become
Of man or worm the vilest here excel me.
They creep, yet see; I, dark in light, exposed
To daily fraud, contempt, abuse and wrong,
Within doors or without, still as a fool
In power of others, never in my own
Scarce half I seem to live, dead more than half.

—*Milton.*

Questions on Literature

Which of Charles Reade's novels was directed against the English prison system?

What desire of Walter Scott eclipsed even his literary ambition?

When did Tennyson become poet laureate and what was the first great poem written after the event?

What career did Thackeray first plan for himself and why did he give it up?

To what subject is the literary talent of Israel Zangwill devoted?

What work of Hans Christian Andersen was written by him in English?

What was the period of Goethe's and Schiller's intimate association?

How does Aristophanes rank in Grecian literature?

How did Herodotus prepare himself for his great work? What well-known appellation has been given him?

In which of his writings is Horace at his best?

What was Livy's great purpose in his works?

What peculiar circumstance directed Virgil toward a literary career?

Whose translation of the *Æneid* has become most popular?

For what reason has the history of Dante's life become half mythical?

Has Dumas a rightful claim to the 1,200 volumes which bear his name?

What is the characteristic of Jules Verne's writings which makes them appeal to readers of all ages?

For what is Emile Zola noted?

What is literature? How old is it?

How old is Sanskrit Literature? Chinese?

What is poetry? Prose? What is a Lyric? An Epic? A Sonnet? An Ode?

Name the divisions into which prose is subdivided.

What is the difference between an essay and an oration?

When did Chaucer live? What is he popularly called because of his relation to English poetry?

When, where, and by whom was print-

ing invented? When was the first book printed?

Where and when was Shakespeare born? When did he die? Where is he buried?

How does Shakespeare rank as a dramatist?

Name five of his most noted productions.

Name five contemporary writers of Shakespeare.

Who wrote "Paradise Lost"?

For what was Spenser noted?

When did Burns live? Name some of his noted poems.

Is Walter Scott more famous for his poems than for his novels? What caused Scott to give up poetry for prose? What are his most famous novels? Name three.

When did Tennyson live? What is the character of his poems?

What famous American orator lived during the Revolutionary War?

For what was Franklin chiefly noted in the field of literature?

Who wrote *The Star Spangled Banner*? *Home, Sweet Home*? *America*?

For what is James Whitcomb Riley best known?

Name three prose writers and three poets of the United States living to-day.

Why is the study of literature so important? Give three reasons for your answer.

Why was Whittier called the Quaker poet?

For what production is Oliver Wendell Holmes best remembered? Lowell? Hawthorne? Cooper?

What is known as the Golden Age of French literature?

Why is King Alfred known as the Father of English Prose?

To the influence of what nation is to be traced much of the correctness and elegance of the literature produced during the age of Queen Anne?

What is the theme with which the *Iliad* deals? How does this epic rank in ancient poetry?

- Christopher Marlowe. 1564-1593
Tamburlaine
2. Prose Writers and Their Principal Works
- a. Historical
Sir Walter Raleigh. 1552-1618
History of the World
- b. Theological
Richard Hooker. 1553-1600
The Ecclesiastical Polity
- c. Philosophical
Francis Bacon
Novum Organum (New Instrument)
Essays
- III. **The Age of Milton**
1. Poets and Their Principal Works
- a. John Milton. 1608-1674
Paradise Lost
L'Allegro
Il Penseroso
- b. Abraham Cowley. 1618-1667
Davideis
2. Prose Writers and Their Principal Works
- a. Izaak Walton. 1593-1683
The Compleat Angler
- b. Jeremy Taylor. 1613-1667
Holy Living and Holy Dying
- c. Dr. Richard Baxter. 1615-1691
The Saints' Everlasting Rest
Call to the Unconverted
- d. John Milton
Areopagitica
Tenure of Kings and Magistrates
- IV. **The Age of Restoration**
1. Poets and Their Principal Works
- a. John Dryden. 1631-1700
Alexander's Feast
Religio Laici
Hind and Panther
2. Prose Writers and Their Principal Works
- a. John Bunyan. 1628-1688
Pilgrim's Progress
Life and Death of Mr. Badman
- b. John Locke. 1632-1704
Essay Concerning Human Understanding
- c. Sir Isaac Newton. 1642-1727
The Principia
Optics
- V. **Augustan Age**
1. Poets and Their Principal Works
- a. Alexander Pope. 1688-1744
Essay on Man
Iliad
Dunciad
- b. Edward Young. 1681-1765
Night Thoughts
Revenge
2. Prose Writers and Their Principal Works
- a. Joseph Addison. 1672-1719
Sir Roger de Coverley Papers
Essays
- b. Richard Steele. 1672-1729
Essays
- c. Jonathan Swift. 1667-1745
- Gulliver's Travels
Journal to Stella
- d. Daniel Defoe. 1661-1731
Robinson Crusoe
Journal of the Plague Year
- VI. **The Age of Johnson**
1. Poets and Their Principal Works
- a. Thomas Gray. 1716-1771
Elegy Written in a Country Churchyard
The Bard
- b. Oliver Goldsmith. 1728-1774
The Vicar of Wakefield
The Traveler
She Stoops to Conquer
The Deserted Village
- c. William Cowper. 1731-1800
The Task
The Diverting History of John Gilpin
- d. Robert Burns. 1759-1796
Cotter's Saturday Night
Tam O'Shanter
2. Prose Writers and Their Principal Works
- a. Samuel Richardson. 1689-1761
Pamela
- b. Henry Fielding. 1707-1754
Tom Jones
- c. Samuel Johnson. 1709-1784
Rasselas
- d. David Hume. 1711-1776
History of England
Essays
- e. Edward Gibbon. 1737-1794
Decline and Fall of the Roman Empire
- f. Edmund Burke. 1729-1797
On Conciliation with America
- VII. **Age of Scott**
1. Poets and Their Principal Works
- a. Walter Scott. 1771-1832
The Lady of the Lake
Marmion
Lay of the Last Minstrel
- b. George Gordon Byron. 1788-1824
Childe Harold's Pilgrimage
Don Juan
The Giaour
- c. John Keats. 1795-1821
Endymion
Eve of St. Agnes
Hyperion
Lamia
- d. The Lake School
William Wordsworth. 1770-1850
Ode on Immortality
Lines on Tintern Abbey
The Excursion
We Are Seven
Samuel Taylor Coleridge. 1772-1834
The Ancient Mariner
Kubla Khan
Christabel
Robert Southey. 1774-1743
Joan of Arc
Roderick, The Last of the Goths
The Curse of Kehama

- Percy Bysshe Shelley. 1792-1822
 Queen Mab
 Ode to the West Wind
 Ode to a Skylark
2. Prose Writers and Their Principal Works
- a. Novelist
 Walter Scott. 1771-1832
 Ivanhoe
 Kenilworth
 Quentin Durward
 Guy Mannering
- b. Essayist
 Charles Lamb. 1775-1834
 Essays of Elia
 Tales from Shakespeare
- VIII. **Victorian Age**
1. Poets and Their Principal Works
- a. Alfred Tennyson. 1809-1892
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 In Memoriam
 Idylls of the King
- b. Elizabeth Barrett Browning. 1806-1861
 Sonnets from the Portuguese
 Aurora Leigh
 Prometheus Bound
- c. Robert Browning. 1812-1889
 My Last Duchess
 Andrea del Sarto
 The Ring and the Book
 Rabbi Ben Ezra
- d. Thomas Babington Macaulay. 1800-1859
 Lays of Ancient Rome
 The Battle of Ivry
- e. Dante Gabriel Rossetti. 1828-1882
 The House of Life
 The Blessed Damozel
- f. Matthew Arnold. 1822-1888.
 Sohrab and Rustum
 Dover Beach
- g. Algernon Swinburne. 1837-1909
 Tristram of Lyonesse
 Atalanta in Calydon
2. Prose Writers and Their Principal Works
- a. Historical
 Thomas Babington Macaulay
 History of England
 Henry Hallam. 1777-1859
 Constitutional History of England
 James Anthony Froude. 1818-1894
 History of England
 Thomas Carlyle: A History
- b. Essayists
 Thomas DeQuincey. 1785-1859
 Confessions of An Opium Eater
 Joan of Arc
 The English Mail Coach
 Thomas Carlyle. 1795-1881
 Sartor Resartus
 French Revolution
 John Ruskin. 1819-1900
 Seven Lamps of Architecture
 Stones of Venice
 Sesame and Lillies
- c. Theological

- John H. Newman. 1801-1863
 Apologia pro Vita sua
 Lead Kindly Light
- C. H. Spurgeon. 1834-1892
 The Saint and His Saviour
 Speeches at Home and Abroad
- d. Scientific
- Sir William Hamilton. 1788-1856
 Discussions on Philosophy and Literature
- Sir Charles Lyell. 1797-1875
 Elements of Geology
 Antiquity of Man
- Charles Darwin. 1809-1882
 Origin of Species
 Descent of Man
- Thomas Huxley. 1825-1895
 Man's Place in Nature
 Elements of Comparative Anatomy
- Herbert Spencer. 1820-1903
 First Principles
- e. Novelists
- Charles Dickens. 1812-1870
 Pickwick Papers
 David Copperfield
 Nicholas Nickleby
- William Makepeace Thackeray. 1811-1863
 Henry Esmond
 The Newcomes
 Vanity Fair
- George Eliot. 1819-1880
 Silas Marner
 Adam Bede
 Felix Holt
- Charles Kingsley. 1819-1875
 Hypatia
- Robert Louis Stevenson. 1850-1894
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 Treasure Island
- IX. **Modern Period**
1. Poets and Their Principal Works
- Robert Bridges. 1844-1930
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- William Butler Yeats. 1865-
 The Wind Among the Reeds
- John Masefield. 1875-
 The Tragedy of Nan
 The Widow in the Bye-Street
- Alfred Noyes. 1880-
 The Loom of Years
 The Enchanted Island
2. Prose Writers and Their Principal Works
- George Bernard Shaw. 1856-
 Man and Superman
 Androcles and the Lion
- Arthur Conan Doyle. 1859-1930
 The Adventures of Sherlock Holmes
 The White Company
- James M. Barrie. 1860-
 The Little Minister
 Peter Pan
- Rudyard Kipling. 1865-
 The Jungle Book
 Kim
- Herbert G. Wells. 1866-

Tono-Bungay.
Mr. Britling Sees It Through
Arnold Bennett. 1867-1931
The Old Wives' Tale
Riceyman Steps
John Galsworthy, 1867-1933
The Forsyte Saga
The Pigeon

AMERICAN LITERATURE

I. Colonial Period

1. Poets and Their Principal Works
 - a. Anne Dudley Bradstreet. 1612-1672
The Tenth Muse
2. Prose Writers and Their Principal Works
 - a. Thomas Hooker. 1586-1647
Fundamental Orders—First Written Constitution
 - b. Cotton Mather. 1667-1728
Witchcraft
Wonders of the Invisible World
Magnalia
 - c. Jonathan Edwards. 1703-1758
Freedom of the Will
 - d. Benjamin Franklin. 1706-1790
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II. Revolutionary Period

1. Poets and Their Principal Works
 - a. Philip Freneau. 1752-1832
The British Prison Ship
Political Poems
John Trumbull. 1750-1831
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 - c. Francis Scott Key. 1780-1842
Star Spangled Banner
2. Prose Writers and Their Works
 - a. Alexander Hamilton. 1757-1804
The Federalist
 - b. Thomas Jefferson. 1743-1826
Rights of British America
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 - c. James Madison. 1751-1836
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 - e. Charles B. Brown. 1771-1810
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III. National Period

1. Poets and Their Principal Works
 - a. William Cullen Bryant. 1794-1878
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My Country's Call
The Ages
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Translation of the Iliad and Odyssey
 - b. Henry Wadsworth Longfellow. 1807-1882
Evangeline
Hiawatha
The Spanish Student
The Courtship of Miles Standish
 - c. John Greenleaf Whittier. 1807-1892
The Barefoot Boy
Snowbound
Among the Hills
 - d. Edgar Allen Poe. 1809-1849
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- The Raven
- e. James Russell Lowell. 1819-1891
The Commemoration Ode
The Vision of Sir Launfal
The Cathedral
- f. Oliver Wendell Holmes. 1809-1849
Old Ironsides
The Poet at the Breakfast Table
The Chambered Nautilus
The Last Leaf
Wonderful One-Hoss Shay
- g. James Whitcomb Riley. 1853-1916
The Old Swimmin' Hole
Afterwhiles
Rhymes of Childhood
- h. Eugene Field. 1850-1895
Little Boy Blue
Jes' 'Fore Christmas
Seein' Things
2. Prose Writers and Their Principal Works

Essayists

- a. Ralph Waldo Emerson. 1803-1882
Representative Men
The Conduct of Life
- b. Henry David Thoreau. 1817-1862
Walden
The Maine Woods
- c. William E. Channing. 1780-1842
Sermons and Reviews

Critics

- a. James Russell Lowell. 1819-1891
- b. Edmund Clarence Stedman. 1833-1908

Historians

- a. George Bancroft. 1800-1891
The United States of North America
History of the Revolution in North America
- b. Richard Hildreth. 1807-1891
The White Slave
History of the United States
- c. William H. Prescott. 1796-1859
Conquest of Mexico
Conquest of Peru
- d. John L. Motley. 1814-1877
The Rise of the Dutch Republic
The United Netherlands
- e. Francis Parkman. 1823-1893
California and the Oregon Trail
The Jesuits in North America
Montcalm and Wolfe
- f. John Fiske. 1842-1901.
Outlines of Cosmic Philosophy
The American Revolution
- g. Theodore Roosevelt. 1858-1919
American Political Ideals

Novellists

- a. Nathaniel Hawthorne. 1804-1864
The Scarlet Letter
The Marble Faun
The House of the Seven Gables
- b. James Fenimore Cooper. 1789-1851
The Spy
The Pilot
The Last of the Mohicans
- c. Harriet Beecher Stowe. 1811-1896
Uncle Tom's Cabin

- d. William Dean Howells. 1837-1920
The Rise of Silas Lapham
A Modern Instance
Venetian Life
A Foregone Conclusion
- e. Henry James. 1843-1916
Daisy Miller
A Passionate Pilgrim
- f. George W. Cable. 1844-1925
Old Creole Days
The Louisiana Lovers
- g. James Lane Allen. 1849-1925
The Kentucky Cardinal
The Choir Invisible
- h. Frances H. Burnett. 1849-1924
Little Lord Fauntleroy
The Shuttle
T. Tembarom
- i. Gertrude Atherton. 1857-
The Conqueror
The Avalanche
The White Morning
- j. Margaretta Deland. 1857-
The Awakening of Helena Richie
The Rising Tide
The Iron Woman
- k. Edith Wharton. 1862-
The House of Mirth
The Reef
- l. George Barr McCutcheon. 1866-1928
Brewster's Millions
Beverly of Graustark
The Prince of Graustark
- m. William S. Porter (O. Henry) 1867-1910
Cabbages and Kings
- n. Booth Tarkington. 1869-
The Gentleman from Indiana
Seventeen
Penrod
The Magnificent Ambersons
- o. Winston Churchill. 1871-
The Crisis
The Crossing
Coniston
The Inside of the Cup
- p. Harold Bell Wright. 1872-
The Winning of Barbara Worth
The Calling of Dan Matthews
When a Man's a Man
- q. Mary Roberts Rinehart. 1876-
The Street of Seven Stars
The Amazing Interlude
The Sub-Deb
Tish

Humorists

- a. Joel Chandler Harris. 1848-1908
- b. Samuel L. Clemens. 1835-1910
Tom Sawyer
Pudd'nhead Wilson
Innocents Abroad

Miscellaneous Writers.

- a. Washington Irving. 1783-1859
- b. Bayard Taylor. 1825-1876
- c. J. G. Holland. 1819-1881
- d. George Ticknor. 1791-1871
- e. Charles Dudley Warner. 1829-1900
- f. Silas Weir Mitchell. 1829-1914
- g. Thomas Bailey Aldrich. 1836-1907.



LITERATURE, BOYS AND GIRLS IN. The portrayal of child life is an interesting and delightful feature of a considerable portion of the world's literature. In the following paragraphs some of the well-known child characters in fiction are presented, and their stories are given in condensed form. It is hoped that the perusal of these narratives will inspire those who have not already done so to seek an acquaintance with the authors represented.

Eppie, the Heroine in "Silas Marner."

The story of little Eppie, one of the most delightful in all the writings of George Elliot, is a beautiful exposition of the theme, "A little child shall lead them." The scene of the story is the old-fashioned English village of Raveloe, which the author describes as "nestling in a snug, well-wooded hollow, quite an hour's journey on horseback from any turnpike." The time is in the nineteenth century.

On the outskirts of the village, not far from a deserted stone-pit, stood a stone cottage inhabited by a hermit weaver named Silas Marner. He was a mystery to all the villagers, and his solitary habits and a rumor that he was subject to fits caused them to regard him with something like fear. Year after year he lived his uneventful life, industriously plying his loom and hoarding his savings like a miser. The superstitious villagers could not know that his precious pieces of gold, which he kept in two thick bags beneath his brick floor, took the place of faith in God, friendship and love. For, before he came to Raveloe, Silas Marner had been betrayed by his best friend, falsely accused of stealing church money, and abandoned by the girl he had hoped to marry. So with faith and hope dead, he had come to let the love of gold take the place of all human interests and affections.

Fifteen years after his appearance in the village Silas was violently torn from his solitary habits by what seemed to him a terrible disaster—the loss of his gold. One evening, while he was out on an errand, a thief entered the cottage and took up the money bags from beneath the floor. One can hardly imagine the agony which came over Silas when he discovered his loss. In his despair he rushed to the village tavern and startled the company there with a request for the constable and justice. It was not long before all the village knew that the miser weaver had been robbed, and his misery was so real and so intense that

it awakened the sympathy of those who had hitherto regarded him with fear or repulsion. People even came to see him in a vain effort to comfort him. But it was the touch of a little child that opened the door to his heart.

On New Year's Eve, when the "great folk" of Raveloe were feasting at the home of Squire Cass, a wretched woman with a sleeping baby in her arms was making her way along a snow-covered path leading to the village. She was the unacknowledged wife of the squire's eldest son Godfrey, and was on her way to the mansion to shame her husband before his guests. In her weariness she had recourse to the only comfort in life that she knew—opium. The dose, in addition to the cold and her fatigue, benumbed her, and just as she came near Silas' cottage she sank down upon the snow and fell into the sleep that has no waking. Aroused from slumber, the little child slipped from her mother's arms and crawled out on the snow. A dancing light had caught her eye, and she toddled after it—on to the open door of Silas Marner's cottage, where there was a bright fire of logs and sticks. Soothed by the warmth and light, the little girl laid her golden head on an old sack before the fire, and was soon fast asleep.

Silas, all this time, was standing in the open doorway, gazing out on the trackless snow. In his ceaseless craving for his beloved money he often went to the doorway and looked longingly about him, as if to see if there might be news of his lost treasure. On this evening, just as he was about to re-enter, he was seized with an attack of catalepsy, and when the child crossed the threshold he was holding open the door and staring out with wide but sightless eyes. When his sensibility returned he closed the door and turned toward the hearth, for he felt cold and faint. As he stooped to push the logs together he saw on the floor before the hearth what seemed to his blurred vision a pile of gold. With a beating heart he stretched out a hand to grasp his treasure, but his fingers touched soft curls instead of gold, and when he knelt down and saw that it was the golden hair of a little child, he thought for a moment that his little sister, who had died years before, had come back to him.

The days that followed held new and strange experiences for the miser. No one came to claim the child, and the mother was buried in a pauper's grave. What stirred the villagers to amazement was the news that Silas Marner was determined to keep the "tramp's child." In answer to questions he would say, "It's a lone thing—and I'm a lone thing. My money's gone, I don't know where—and this is come from I don't know where." The difficulties that are likely to beset a lone bachelor with a two-year-old child on his hands were not lacking in Silas's case, but he had the practical help of his neighbor, Dolly Winthrop, who brought over some of her little Aaron's outgrown garments and mothered the little waif in the good old-fashioned way. "Anybody 'ud think the angils in heaven couldn't be prettier," said Dolly, after

she had washed and dressed the child, and smoothed her golden curls.



SILAS FINDS EPPIE

So the tramp's child became an inmate of the stone cottage, and as the days passed by chords of love, sympathy and kindness, long dormant in the miser's heart, were slowly stirred to life. Silas had the baby christened Hepzibah, after his mother and sister, but he called her Eppie, for thus the long name had been softened in the days gone by. And as the child grew, "his mind was growing into memory; as her life unfolded, his soul, long stupefied in a cold, narrow prison, was unfolding too, and trembling gradually into full consciousness." The care and training of the lively little girl, however, presented many a problem, as Silas often discovered. His friendly counsellor, Dolly Winthrop, advised "smacking" her or putting her in the coal hole when she misbehaved. Silas could not bear to "smack" her, but one day he did try the coal hole form of discipline. He had tied Eppie to his loom to keep her out of mischief, and while he was busy "setting up" a new piece of work, she snatched his scissors and cut the strip of linen that bound her. Finding herself free, she ran out into the sunshine and was out of sight before he missed her. The anguish that Silas suffered before he found her, playing on the edge of a small pond, stirred him to unusual resolution. How he punished her we will let the author tell.

"'Naughty, naughty Eppie,' he suddenly began, holding her on his knee, and pointing to her muddy feet and clothes—'naughty to cut with the scissors and run away. Eppie must go into the coal hole.' He half expected

that this would be shock enough, and that Eppie would begin to cry. But instead of that, she began to shake herself on his knee, as if the proposition opened a pleasing novelty. Seeing that he must proceed to extremities, he put her into the coal hole, and held the door closed, with a trembling sense that he was using a strong measure. For a moment there was silence, but then came a little cry, 'Opy, opy,' and Silas let her out again, saying 'Now Eppie 'ull never be naughty again, else she must go in the coal hole—a black naughty place.'

"The weaving must stand still a long while this morning, for now Eppie must be washed, and have clean clothes on, but it was to be hoped that this punishment would have a lasting effect and save time in future—though, perhaps, it would have been better if Eppie had cried more.

"In half an hour she was clean again, and Silas, having turned his back to see what he could do with the linen band, threw it down again, with the reflection that Eppie would be good without fastening for the rest of the morning. He turned round again, and was going to place her in her little chair near the loom, when she peeped out at him with black face and hands again, and said, 'Eppie in de toal hole.'"

In commenting on the futility of this method of discipline the author goes on to say that the stone hut was made a soft nest for Eppie, lined with downy patience; and also in the world that lay beyond the stone hut she knew nothing of frowns and denials. For the little curly-haired Eppie, the weaver's child, became an object of interest throughout the neighborhood. Silas usually carried her with him when he delivered his yarn and linen, and he was always heartily welcomed in these days. At home, in the atmosphere of love and sympathy, she grew to be the sole comfort of his life.

The story of Eppie would not be complete without a look into her future. It seems perfectly natural that Dolly's little Aaron, who grew up with her, should learn to love her, and that the story should end with a wedding. One episode in Eppie's life, however, was never known to the villagers, though we may share the secret. Shortly before her marriage the stone cottage was visited by Mr. and Mrs. Godfrey Cass. Mr. Cass confessed to the wondering girl that he was her father, and that to atone for his neglect he wished to adopt her. I am sure you will be glad to know that Eppie decided that Silas had more claim to her daughterly love than the repentant gentleman. In answer to Godfrey's request, she said, "I can't feel as I've got any father but one. I wasn't brought up to be a lady, and I can't turn my mind to it. I'm promised to marry a working man, as 'll live with father, and help me to take care of him."

And let us take leave of Silas and Eppie with the words the bride utters as she returns from the simple church wedding: "O, father, what a pretty home ours is! I think nobody could be happier than we are."

Tom and Maggie Tulliver. A considerable portion of George Elliot's *Mill on the Floss* is devoted to the childhood of Tom and Maggie Tulliver, and to many readers this is the most charming section of the book. Maggie, as first presented, is a dark-haired, restless child of nine, whose naughty ways are a perpetual source of worry to her dull but amiable mother. Maggie is decidedly her father's favorite, though he sometimes wishes her "cuteness" could have been bestowed upon thirteen-year-old Tom, as the following dialogue indicates:

Mr. Tulliver: What I'm a bit afraid on is, as Tom hasn't got the right sort o' brains for a smart fellow, I doubt he's a bit slowish. He takes after your family, Bessy.

Mrs. Tulliver: Yes, that he does; he's wonderful for liking a deal o' salt in his broth. That was my brother's way and my father's before him.

Mr. Tulliver: It seems a bit of a pity, though, as the lad should take after the mother's side instead of the wench. The little un takes after my side, now: she's twice as 'cute as Tom. Too 'cute for a woman, I'm afraid. It's no mischief much while she's a little un, but an over-'cute woman's no better nor a long-tailed sheep—she'll fetch none the bigger price for that.

This dialogue occurs in a discussion about sending Tom to a school where he can get his brains "smartened up" and be trained "to make a nest for himself." For Mr. Tulliver considered that his son had exhausted the resources of the neighboring academy, and ought to go where they would make a "scholar" of him. The day that Tom was brought home from the academy was a red-letter day for Maggie, for she loved her brother with all her heart. To be sure, she was bitterly disappointed at not being allowed to ride in the gig with her father to fetch Tom, and therefore refused to have her hair combed, but her childish sorrow was forgotten later in the day, when her rosy-cheeked brother arrived, especially when he showed her the new fish-line he had bought for her out of his own savings.

A few days later the house was enlivened by the arrival of Mrs. Tulliver's three sisters—Aunt Glegg, Aunt Pullet and Aunt Deane. This influx of relatives was the result of Mrs. Tulliver's determination that the subject of Tom's schooling should be talked over by the family. When Mr. Tulliver first broached the subject she had said, "Well, Mr. Tulliver, you know best; I've no objections. But hadn't I better kill a couple o' fowl and have th' aunts and uncles to dinner next week, so as you may hear what Sister Glegg and Sister Pullet have got to say about it?" From which it may be seen that Mrs. Tulliver set great store by the opinion of her family. Tom and Maggie considered the aunts an unmitigated nuisance, but Tom found compensation in the extra goodies that his mother always baked when company came, especially "apricot roll-up," and Maggie was solaced by the presence of her pretty little cousin, Lucy Deane.

Maggie was not a favorite with any of her aunts. They considered her thick, shaggy locks and brown skin an unpardonable blot on the family reputation for beauty, and her boisterous ways a reflection on Sister Bessy's methods of discipline. So when the child first entered the room where her aunts were collected they began to "pick on" her. Because she rushed at once to greet the much-loved Lucy, Aunt Glegg called out loudly, "Heyday! Do little gells come into a room without taking notice o' their uncles and aunts? That wasn't the way when I was a little gell." Maggie's rough hair next brought a comment from Aunt Pullet: "I think the gell has too much hair. I'd have it thinned and cut shorter, Sister, if I was you; it isn't good for her health. It's that as makes her skin so brown, I shouldn't wonder. Don't you think so, Sister Deane?" Maggie had suffered too much from her teasing locks to bear amiably any critical remarks about them. Her mother was always worrying her by trying to curl her hair, and as it never stayed in curl more than a few minutes the front locks were always getting in her eyes. Accordingly, she came to a quick decision about the fate of that unlucky head of hair.

As soon as an opportunity came she whispered to Tom to follow her upstairs, and led

Tom cut the back locks, and he found as much joy in obeying her as when he had secretly cut the pony's mane. But the result was a disappointment to poor Maggie, for Tom cried out in great glee, "Oh, my buttons, what a queer thing you look! Look at yourself in the glass—you look like the idiot we throw out nutshells to at school." Such unkind remarks brought an outburst of angry tears, and Tom hurried down to dinner leaving his sister weeping before the mirror. However, after a few minutes he returned with reports of "custard, and nuts and things," and so she decided to go down and face the family.

Her appearance startled the family and the guests alike. Mrs. Tulliver screamed, but Mr. Tulliver laughed outright and said, "Did you ever know such a little hussy as it is?" Aunt Glegg gave it as her opinion that "gells" who cut their own hair should be whipped and fed on bread and water, while Uncle Clegg jokingly added that jail was the place for such girls. Aunt Pullet thought she looked "more like a gypsy nor ever," Mrs. Tulliver prophesied she would break her mother's heart some day, and even Tom whispered, "Oh, my! Maggie, I told you you'd catch it." Poor Maggie knew of only one unfailing source of comfort, and running to her father, she buried her face on his shoulder and burst into wild sobbing. "Come, come, my wench," he said kindly, "never mind; you was in the right to cut it off if it plagued you. Give over crying; father'll take your part." Many years afterward, when people said that Mr. Tulliver had done ill by his children, Maggie remembered the times that "father took her part."

The hair-cutting episode is typical of Maggie's tempestuous childhood. Yet we love her better than we do Tom, for she is tender-hearted, generous and impulsive, where he is cold, hard and narrow. He develops a stable, well-controlled character, which comes out strongly when his father's financial ruin and death put heavy burdens on his young shoulders, but our sympathy is always with his sister. One of the most pathetic notes in the story is the final estrangement of brother and sister, after many heartaches and misunderstandings. For in a bitter crisis in Maggie's life her brother judged her harshly and told her that he would never see her again. The days that followed were full of despair for Maggie, and she did not see her brother again until their last meeting on earth. One night a disastrous flood broke over the town. Maggie managed to get a boat out on the flooded fields, and she rowed it to the old home where her childhood had been passed. A call brought her brother to an upstairs window, which was then on a level with the water, and he stepped into the boat with her. Face to face they floated out on the river, and in that hour of peril all was made right between them. But as they came into the current of the stream a huge mass of wreckage bore down upon them. Then said Tom, in a deep, hoarse voice, as he clasped his sister to him, "It is coming, Maggie."



TOM AS MAGGIE'S BARBER

him into her mother's room. Then she took out a large pair of scissors from a drawer. "What are they for, Maggie?" asked her brother, his curiosity awakened. Maggie replied by seizing the front locks and cutting them straight across the middle of her forehead. When she had snipped off all the hair that she could reach conveniently she made

"The boat reappeared—but brother and sister had gone down in an embrace never to be parted: living through again in one supreme moment the days when they had clasped their little hands in love, and roamed the daisied fields together."

David Copperfield. This popular story by Charles Dickens is in part a narrative of the author's own life. The opening chapter presents a picture of a charming old house in the English village of Blunderstone, where David, the hero of the tale, was born. On a windy March day, not many hours before he made his entrance into the world, his mother, six months a widow, was sitting sadly before the parlor fire. As she was drying her tears she saw through the window a tall, rigid lady coming up the garden path. This unexpected visitor proved to be Miss Betsy Trotwood, the eccentric aunt of Mrs. Copperfield's late husband. The conversation that followed gives us a clue to this remarkable lady's character, and it is important to know about her, for she plays a large part in the later chapters of the story.

She was a practical, unsentimental sort of a person, and she became very indignant when the poor young widow, between her sobs, told her that Mr. Copperfield had named their home the "Rookery" because there were some deserted rooks' nests in the tall elm trees that grew in the garden. Later, when Mrs. Copperfield's servant brought in the tea and Miss Trotwood discovered that her name was Peggotty, that strong-minded person demanded, "Do you mean to say that any human being has gone into a Christian church, and got herself named Peggotty?" She was only appeased when it was explained that Peggotty was her last name, and it was used because both mistress and maid bore the first name of Clara. In the course of her remarks Miss Trotwood informed the young widow that she expected the coming little stranger to be a girl, and that she was to be named Betsy Trotwood Copperfield. When, a few hours later, young David arrived, his great aunt considered herself unduly affronted, and departed in great indignation. And that was the last they heard of Miss Trotwood for many a year. Later she enters the story again and becomes a lovable character.

David lived very happily with his mother and his good nurse Peggotty until he was about eight years old. Then his mother married a black-whiskered gentleman by the name of Murdstone, and all their happy times came to an end. Between the stern stepfather and his sour-tempered sister, Miss Jane, David had anything but a cheerful time, and he was finally sent off to a boarding school near London. Mr. Barkis, the carrier who took him as far as Yarmouth, was very inquisitive about Peggotty as they rode along together, and when David told him what delicious pies and cakes she baked, the carrier asked him to send the following message in his first letter—"Barkis is willin'." But it was quite a long time before David knew what Barkis meant.

In due time young Copperfield arrived at a school called Salem House, conducted by a Mr. Creakle. The chief educational qualifications of this gentleman were a strong right arm and an inclination to use it in caning the boys. David, being a chubby lad, had good reason to get well acquainted with the cane, for Mr. Creakle took great delight in cutting at the chubby boys as he passed up and down the aisles. Among David's schoolmates there were two for whom he acquired a special liking—handsome James Steerforth, the cock of the school, who was never punished, and Tommy Traddles, who was clad in a tight suit that made his arms and legs look like sausages, and was caned every day. Both of these boys David saw again in after years, and both entered deeply into his life.

The days passed quickly by and brought the first half-year to a close. Then David returned home for a month's vacation. Fortunately for him he arrived at a time when Mr. Murdstone and his sister were away visiting, and the lad and his mother and Peggotty had one of their old cozy times before the parlor fire before the others returned. David had found a baby brother in his mother's arms, and he loved him for her sake. As they dined together at the fireside he told Peggotty about Mr. Barkis and his strange interest in her. She interrupted the story by throwing her apron over her face and laughing as if she could never stop.

"What are you doing, you stupid creature?" said Mrs. Copperfield.

"Oh, drat the man!" cried Peggotty. "He wants me to marry him."

"It would be a good match for you, wouldn't it?" asked her mistress.

"Oh! I don't know," said Peggotty, "Don't ask me. I wouldn't have him if he was made of gold. Nor I wouldn't have anybody."

"Then, why don't you tell him so, you ridiculous thing?" said David's mother.

"Tell him so," retorted Peggotty, "he has never said a word to me about it. He knows better. If he was to make so bold as say a word to me, I would slap his face."

These and similar protestations from Peggotty seemed to prove a relief to Mrs. Copperfield, who appeared to David to look careworn and delicate. But they had a very happy time together until ten o'clock, when Mr. and Miss Murdstone returned. David hurried to bed when he heard the sound of wheels, and so did not meet his lately-acquired relatives until the next morning. The gracious and charming Miss Murdstone greeted him with the tea-caddy scoop and the remark, "Ah, dear me! How long are the holidays?" When she was told they lasted a month from that day, she said, "Then here's one day off." Both she and her brother contrived to make David about as miserable as a small boy can be, and he was not sorry when it was time to return to school. To be sure, he was going back to beatings, but he was also returning to Steerforth and the other boys. His last view of his loved mother is well worth recording here, in his own words:

"I kissed her, and my baby brother, and was very sorry then, but not sorry to go away, for the gulf between us was there, and the parting was there, every day. And it is not so much the embrace she gave me, that lives in my mind, though it was as fervent as could be, as what followed the embrace.

"I was in the carrier's cart when I heard her calling to me. I looked out, and she stood at the garden gate alone, holding her baby up in her arms for me to see. It was cold still weather; and not a hair of her head, nor a fold of her dress, was stirred, as she looked intently at me, holding her child.

"So I lost her. So I saw her afterwards, in my sleep at school—a silent presence near my bed—looking at me with the same intent face—holding up her baby in her arms."

The next event of importance occurs two months later. On the morning of his birthday David received the news that his mother had died and he was to go home. The chief solace of the desolate little orphan during the sad days that followed was kind old Peggotty, and when the amiable Miss Murdstone gave her notice to leave, she obtained permission to take the boy away with her for a visit to Yarmouth. For Peggotty had a fisherman brother living there, in the jolliest kind of a house David had ever seen. He had visited there once before, and knew the joys of living in a house that had once been a boat. He knew also he would find there pretty, blue-eyed little Emily, an orphan niece of Mr. Peggotty. David admired Mr. Peggotty immensely; and thought him the finest man who ever sailed the seas. He considered him a model of generosity, as well, for he supported, besides little "Em'ly," a husky nephew by the name of Ham, and a lone, lorn widow who complained from morning till night. But, even when Mrs. Gummidge was the most disagreeable, Mr. Peggotty always excused her by saying she was thinking of the "old un."

In the company of these simple, kindly people, David forgot some of his troubles, though he did wish little Em'ly wouldn't tease him so much. In fact, he decided that he was desperately in love with the mischievous little maid. A romance of another sort was taking place at the same time, for every evening Mr. Barkis came to woo Peggotty, and brought her oranges, onions, pickled pork and other delicacies. As for Peggotty, she used to laugh by the hour after he had departed, but she was not blind to the virtues of the good carrier. One day, shortly before David returned to Blunderstone, Mr. Barkis drove up in a chaise cart, and took Peggotty, David and Emily out for a holiday ride. The first place they stopped at was a church, where the two elders seemed to have some business to transact. After they had come out of the church and were riding along again, Mr. Barkis announced with a roar of laughter that Peggotty's name was now Clara Peggotty Barkis. So the holiday ride was a wedding trip, and I doubt if there ever was a wedding journey enjoyed more than that one.

After David returned to the Rookery he had

a sorry time of it, for the Murdstones regarded him as a hateful burden. Finally his stepfather sent him to London to work in a wine warehouse in which he had an interest. Never in his life had David suffered as he did then. He worked all day long washing empty bottles and pasting labels on full ones, for about seven shillings (\$1.75) a week. He had no congenial companions, no opportunities to study, no home comforts. In fact, the only people who took any interest in him were the Micawbers, at whose house he lodged. Mr. Micawber was always in debt and always looking for something to "turn up," but Mrs. Micawber, with perfect confidence in her husband's abilities, declared she would never desert him. This worthy couple and their four children lived chiefly on hope and gentility. After several months, during which David grew shabbier and more discouraged every day, Mr. Micawber was sent to prison for debt. This event proved to be a crisis in that hopeful gentleman's career, for Mrs. Micawber's family helped him out of his difficulties and assisted the unfortunate family to remove to another town. This left David practically friendless, and he decided to run away, lest he should become a vagabond.

During those months of degrading toil he had formed a desperate resolution—that he would throw himself on the mercy of his aunt, Miss Trotwood. He knew she lived near Dover, and was comfortably well off. Though he had heard many times the story of her abrupt departure on the night of his birth, he remembered his mother's fancy that Miss Betsy had, in a moment of tenderness, gently touched the widow's pretty hair. This softening note in the story gave him the necessary courage to start on his journey. At the outset a rascally cart-driver robbed him of his box of clothing and a half-guinea piece (about \$2.50) that Peggotty had sent him. Thus he had to pawn what clothes he could spare to get money to buy food, and when, after many days, he arrived at Dover, he was in the last stages of dilapidation and weariness.

Miss Trotwood lived just out of Dover, in a pretty little cottage by the sea. She was at work in her garden when the forlorn little fellow approached her. Without a scrap of courage, but with a great deal of desperation, he went to her side and touched her. "If you please, ma'am," he said, timidly. She started and looked up. "If you please, Aunt, I am your nephew." "Oh, Lord!" she said, and sat down flat in the garden path. Then David told his pitiful story, ending it with a passion of crying that had been pent up within him all week.

There is no space here to tell in detail how she took the little waif into the house and washed and fed him. But you will be glad to know that David at last found a comfortable home and someone to love him, for austere Miss Betsy proved to be one of the kindest and most generous of guardians. Before she formally adopted the little runaway she wrote to Mr. Murdstone and informed him of David's

arrival. He and his sister condescended to pay Miss Trotwood a visit, as a result of which they were relieved of all responsibility over David, and were treated to a piece of Miss Betsy's mind. The reader who doesn't enjoy that episode as the author relates it isn't quite human.



DAVID MEETS HIS AUNT

We will take leave of our little hero in Miss Trotwood's cottage by the sea. How she sent him to a splendid school, and what use he made of his advantages in later years, together with a multitude of interesting details about the Peggotty's, little Em'ly, Steerforth, Traddles and many others, are all told in the fascinating way that makes Charles Dickens loved by hosts of readers.

Rebecca of Sunnybrook Farm. Kate Douglas Wiggin Riggs is the author of this charming story of a little American girl. The book is published by Houghton, Mifflin and Company. Rebecca was the second child in a family of seven children, whose widowed mother found it difficult to make ends meet. They lived on a Maine farm which Rebecca described as "away off from everywhere," whose one redeeming feature was a chattering little brook full of sparkles all day long when the sunshine played on it. A farm possessing such a pretty little brook ought to be called Sunnybrook, according to Rebecca, but the neighbors called it simply Randall's Farm. Mrs. Aurelia Randall, Rebecca's mother, was one of the three Sawyer girls of Riverboro. She had contracted a luckless marriage with a good-looking dancing master, whose chief asset was the high-sounding name of Lorenzo de Medici. Lorenzo proceed-

ed to spend Aurelia's little fortune as fast as possible, by making an investment for each son and daughter that blessed their union. His last investment, the purchase of Sunnybrook Farm, was made just before his seventh child was born. On the day she came into the world he departed from it, "a duty somewhat too long deferred," as the author puts it.

Aurelia's two spinster sisters, who lived in the family brick house in Riverboro, tried to do their duty by the happy-go-lucky family, and the elder, Miss Miranda, finally offered to educate one of the children. She asked to have the oldest girl, Hannah, sent to her, but Aurelia could not spare her, and sent Rebecca instead. At this time Rebecca was a lively child of about ten. What her aunt thought of her may be judged from her remarks when she had read Aurelia's letter informing her of Rebecca's coming. In that letter the hopeful mother expressed the belief that the schooling her aunt would give the child would be the making of Rebecca. "I don't know as I cal'lated to be the makin' of any child," said Miranda, grimly; "I s'posed, of course, Aurelia would send us the one we asked for, but it's just like her to palm off that wild young one on somebody else." But Aunt Jane took a more hopeful view of the case.

The "wild young one" arrived in Mr. Jeremiah Cobb's stagecoach in due time. She was dressed in a stiffly-starched buff calico gown "buttoned down before," and she carried a bunch of faded flowers and a pink parasol. The flowers she presented to her Aunt Miranda, who received them with the gracious remark that the garden was full of flowers and there was no call to bring any. As Miss Miranda showed Rebecca to her room upstairs she said, "Ain't you got your dress on hind side foremost!" Rebecca surveyed the row of pearl buttons running up and down her chest and said cheerfully, "Hind side foremost? Oh, I see! No, that's all right. If you have seven children you can't keep buttonin' and unbuttonin' 'em all the time—they have to do themselves. We're always buttoned up in front at our house. Mira's only three, but she's buttoned up in front, too."

The Monday after Rebecca's arrival in Riverboro she started to school in Riverboro Centre, a mile away. Mrs. Rigg's clever pen has given a vivid picture of an old-fashioned New England village school, where nobody studied the same book with anybody else, and everybody had his own particular fund of learning. Rebecca was in the same reading class with two older boys preparing for Wareham Academy. She recited arithmetic, her weak point, with a small, lisping Simpson child, "Thuthan." Emma Jane Perkins, her special confidante and playmate, was her partner in geography, and she recited history with Alice Robinson's class. It should be added that Rebecca could easily have left the history class far in the rear, except that such progress would necessitate her reciting with Seesaw Simpson. This youth had earned his remarkable name through his fondness for changing his mind, for his playmates rightly

considered his baptismal name of Samuel inappropriate for one who never could come to a decision. Opposites are often mutually attracted, but in the case of Seesaw and Rebecca the attraction was entirely one-sided. She despised the pale, round-shouldered, stammering Seesaw, and he was fascinated by the energetic, dark-eyed little maid who certainly knew her own mind on all occasions.

Amid such surroundings Rebecca began her ascent of the ladder of learning. She knew that she must learn all she could so that some day she might help to pay off a hateful mortgage that rested on Sunnysbrook Farm. It was this knowledge that helped her to endure the restrictions and commands of her grim Aunt Miranda, for she usually fell far short of that austere lady's standards. "She continually forgot and started up the front stairs because it was the shortest route to her bedroom; she left the dipper on the kitchen shelf instead of hanging it up over the pail; she sat in the chair the cat liked best; she was willing to go on errands, but often forgot what she was sent for; she left screen doors ajar, so that flies came in; her tongue was ever in motion, she sang or whistled when she was picking up chips; she was always messing with flowers, putting them in vases, pinning them on her dress, and sticking them in her hat; finally, she was an everlasting reminder of her foolish, worthless father." But had Miss Miranda only known it, it was the fact that Rebecca was not all Sawyer that saved her from being commonplace. The stars that presided over her destiny decreed that she should inherit her father's graces but none of his weak points.

The effect of Rebecca's personality on Miss Dearborn, her teacher, and on her playmates is well brought out in the chapter describing a special day program. Special programs were held on Friday afternoons, and they were usually periods of anguish for teacher, pupils and parent alike. The imaginative Rebecca brought about radical changes, and the program for this particular Friday seemed so promising that some of the more important adults of the village were invited to attend. Rebecca and Emma Jane Perkins had learned an interesting dialogue, lisping Susan Simpson had been taught a poem in which she took the part of a lisping child, and there were other good features. In the morning Rebecca and Living Perkins were commissioned to decorate the blackboard, and when Rebecca drew a beautiful American flag that looked exactly as if it were fluttering in the breeze the teacher asked the pupils to give her a good hand-clapping. Then they all stood up and sang "Three Cheers for the Red, White and Blue," and all pointed to the flag when they came to the chorus.

Our little heroine went home to lunch that day in a very exalted mood, for never before in her short life had she been so praised and applauded. She found the brick house deserted, and on the dining room table a note from Aunt Jane saying that the sisters had gone to a neighboring village. Flying up

to her bedroom, she saw on the bed a pretty pink gingham dress that kind Aunt Jane had finished that morning. There was no opportunity to ask leave, and she decided to wear the dress without permission, for this was a grand occasion, "almost like a Sunday School concert." Then she put on the new dress and her best shoes, and unbraided her pretty dark hair, letting it fall in waves and tying it back with a ribbon. She completed her toilet by getting out her pink parasol, the most precious thing she possessed. As she had to take the part of a city girl in the dialogue with Emma Jane, she decided that the parasol would be entirely appropriate. It was a transformed Rebecca who started back to school that afternoon—a girl with glowing cheeks and sparkling eyes. "Rebecca Randall," exclaimed Emma Jane when she saw her, "You're handsome as a picture!" As for the entertainment, it was a success from start to finish. The mothers for once did not have to blush for shame at their children's failures, for nobody forgot his "piece," and nobody broke down. Rebecca's magnetism and enthusiasm dominated everything, and though she did not put herself forward, she seemed to lead them all.

The reception the happy child received on reaching home that afternoon is typical of a good many episodes in Rebecca's career in



MISS MIRANDA ABOUT TO FREE HER MIND

the brick house. "Step right in here, Rebecca," were the words that greeted her as she came face to face with Miss Miranda. Then followed a scene that was the anticlimax of that eventful day. Her sins were

enumerated one by one—that she had worn her good dress without permission, used the front stairs to go to her room, left the screen out of her window, never cleared away her lunch dishes, and left the side door unlocked from half past twelve to three o'clock. In fact, the scolding that she received was so severe that she crept to her room convinced that life was an utterly joyless thing. As she lived through the scenes of the day she decided she could bear her aunt no longer, and after putting on her oldest clothes she climbed out of her window and slid down to the ground by way of a lightning rod, porch and woodbine trellis. Though it was raining hard she made her way to the home of Uncle Jerry Cobb, who had never ceased to love her since the day he drove her to Riverboro. If you want to know how he talked her out of her foolish plan to go back home, and how he smuggled her into the brick house that night without Miss Miranda's knowledge, you must read Mrs. Riggs' book. As to the effects of Miranda's discipline, hear the dialogue that took place the next day:

"I never see a child improve in her work as Rebecca has today," remarked Miranda Sawyer to Jane on Saturday evening. "That settin' down I gave her was probably just what she needed, and I dare say it'll last for a month."

"I'm glad you're pleased," returned Jane. "A clinging worm is what you want, not a bright, smiling child. Rebecca looks to me as if she'd been through the Seven Years' War. When she came downstairs this morning it seemed to me she'd grown old in the night. If you follow my advice, which you seldom do, you'll let me take her and Emma Jane down besides the river tomorrow afternoon and bring Emma Jane home to a good Sunday supper. Then if you'll let her go to Milltown with the Cobbs on Wednesday, that'll hearten her up a little and coax back her appetite. Wednesday's a holiday on account of Miss Dearborn's going home to her sister's wedding, and the Cobbs and Perkins want to go down to the Agricultural Fair." After all, there is an Aunt Jane in this world for every Miranda.

Three years passed and Rebecca was ready to enter Wareham Academy. In those three years she learned many lessons about self-control, thoughtfulness and similar qualities supposed to be lacking in a Randall. Several milestones marked her course, such as the day when she and Emma Jane sold soap in order to get a premium for the luckless Simpson family. The premium, a banquet lamp with a gorgeous shade, was acquired after Rebecca had interviewed a delightful and generous gentleman named Adam Ladd, who ordered three hundred cakes on the spot. Mr. Ladd, by the way, became Rebecca's loyal friend, and the reader suspects that he married her after she grew up. Another milestone was the visit of the Syrian missionaries to the brick house. It may sound improbable, but through Rebecca's "interference" Miss Miranda entertained two missionaries and

their two children overnight, and had refreshments in the evening for a few church members who called.

Wareham Academy opened up a new world to Rebecca. She was accompanied there by the faithful Emma Jane, who would have gone to China to school to be near Rebecca. The girls roomed together at the academy during the winter months, and traveled on the cars between Wareham and Riverboro when the weather was mild. In subjects like Latin translation, history and English literature Rebecca did so brilliantly that she became a marked character in the school, and in the spring of her second year she was elected assistant editor of the "Wareham School Pilot."

Mr. Ladd sometimes came to Wareham to see his protegee, and she also enjoyed the special friendship of the gifted literature teacher, Miss Maxwell. As for Rebecca, she adored Miss Maxwell with a fervor that cannot be described. These joys of school life were offset, about the middle of her course, by financial troubles at the brick house and at Sunnysbrook Farm. Rebecca had to wear turned and made-over clothes day in and day out, and the fifty dollars she won as a prize in a composition contest had to be used to pay the interest on the hateful mortgage. Rebecca wrote a poem about this mortgage one day:

"Will you pay a little faster?" said the mortgage to the farm;

"I confess I'm very tired of this place."

"The weariness is mutual," Rebecca Randall cried;

"I would I'd never gazed upon your face."

By dint of hard work Rebecca completed her course in three years, and was elected president of the graduating class. Her commencement dress was a marvel of ingenuity, for, seeing nothing else to do, she and Emma Jane raided the Perkins attic and brought out of it yards of white cheesecloth. Though she was not graduating, Emma Jane had to sing with the school, and since she was to wear a white dress, she determined to have it a duplicate of Rebecca's. The dresses were made lovely by means of pin-tucking, hem-stitching, tatting and similar forms of needlework, and the president of the class, on commencement day, was truly a joy to the eye. As she read the class poem, "Makers of Tomorrow," her personality made the school-girl effort seem like the verse of a Milton. And when she came forward to get her diploma, Jeremiah Cobb nearly wore out the pew in which he was sitting, in his efforts to express his satisfaction over the occasion.

Rebecca had expected to go to Brunswick with Miss Maxwell the day after graduation, but the serious illness of her Aunt Miranda called her back to the brick house. Then came a hard, weary summer, which she bore patiently because of her gratitude for what the cross old aunt had done for her. After a few weeks Miranda grew stronger, and Rebecca began to get ready for her postponed visit. On the day she expected to leave,

word came that her mother had hurt herself badly, and the Brunswick journey had to be abandoned. Rebecca was sorely needed at Sunnybrook Farm, for Hannah had been married for some time. During two months of washing, ironing, cooking and taking care of the children our heroine learned the beauty of self-denial and unselfishness, and she learned, too, that though life is often hard, it is a good thing to be alive. But this time of trial, like other troubles, came to an end.

One day Rebecca received word that Aunt Miranda was dead. Within an hour after the message came she was on her way to Riverboro, and when she arrived at the brick house she heard from poor Aunt Jane that Miranda had willed her the house and furniture and the land about as far as one could see. Later, as she sat in the quiet doorway, a sense of gratitude and peace came over her.

"This was home; her roof, her garden, her green acres, her dear trees; it was shelter for the little family at Sunnybrook; her mother would have once more the companionship of her sister and the friends of her girlhood; the children would have teachers and playmates.

"And she? Her own future was close-folded still; folded and hidden in beautiful mists; but she leaned her head against the sun-warmed door, and closing her eyes, whispered, just as if she had been a child saying her prayers: 'God bless Aunt Miranda; God bless the brick house that was; God bless the brick house that is to be!'"

The Birds' Christmas Carol. This is another of Kate Wiggins Riggs' delightful child stories. It is about a little girl who came on Christmas morning into the home of the Bird family. Her happy mother, as she listened to the boy choir of the church next door singing, "Carol, brothers, carol," decided that Carol was just the name for a child born on Christmas Day, and so Carol Bird became the new baby's name. As she was the first girl in a family of four children, Carol was considered the dearest little sister in all the world, and her birthdays were occasions for wonderful celebrations. But she was not strong, and in the years following her fifth birthday she became a helpless invalid. The room in which she was born was made as beautiful as could be, and was so filled with windows it looked like a conservatory. Here she was shut in day after day, but when she was strong enough she used to love to look out through the back windows on the alley below, for it contained the house of the nine Ruggles children. Never was there a more obliging family of children. When Carol was feeling well they played circus and other noisy games, but when she had a headache they substituted deaf and dumb asylum and were as quiet as mice.

A few days before her tenth birthday Carol's beloved Uncle Jack arrived from London to spend Christmas with her. As she talked over her plans for the day she told him she wanted to give that Christmas to the Ruggleses, and have them eat a real Christmas dinner in her own room. Uncle Jack was to

sit at the head of the table and Mamma Bird was to be there to help, but Papa Bird and the boys were to eat down stairs, so as not to embarrass the nine Ruggleses. Of course every one agreed to Carol's plan, and her invitation caused wild excitement in the little house in the alley. Mrs. Ruggles had her brood up and at the breakfast table by seven o'clock Christmas morning, for she had to see about their costumes and give them some necessary lessons in manners before half past five. Sarah Maud was the oldest, and Baby Larry the youngest; in between were Peter, Susan, Kitty, Peoria, Cornelius, Clem and Elly. They all looked exactly alike, except that some of them had more freckles than the others.

After breakfast there ensued such a scrubbing and dressing up as the little house had never before witnessed. Kitty's red hair was curled in thirty-four ringlets, Susan and Elly wore theirs in two braids, Sarah Maud rejoiced in one pig-tail, and Peoria's hair stuck out on all sides. As for the boys, Larry had a suit made out of a red plaid shawl, and Peter's purple necktie was adorned with a wonderful green glass breastpin.

For an hour before it was time to go the Ruggleses were given a severe course in manners. As the nine children took their seats in a semicircle about her, Mrs. Ruggles endeavored faithfully to show them how to behave at their first dinner party. After they were coached in the formalities of entering a room properly, and Sarah Maud had learned by heart a polite speech to explain their lack of hats, the anxious mother turned to one of the boys:

"Now, Cornelius, what are you goin' ter say ter make yerself good com'ny?"

"Do? Me? Dunno!" said Cornelius, turning pale.

"Well, ye ain't goin' to set there like a bump on a log 'thout sayin' a word ter pay for yer vittles, air ye? Ask Mis' Bird how she's feelin' this evenin', or if Mr. Bird's havin' a busy season, or how this kind o' weather agrees with him, or something' like that. If they have napkins, Sarah Maud down to Peory may put 'em in their laps, 'n' the rest of ye can tuck 'em in yer necks. Don't eat with yer fingers—don't grab no vittles off one 'nother's plates; don't reach out for nothin', but wait till yer asked, 'n' if you never git asked don't git up and grab it. Don't spill nothin' on the tablecloth, or like's not Mis' Bird'll send yer away from the table—'n' I hope she will if yer do! Now we'll try a few things ter see how they'll go! Mr. Clement, do you eat cramb'ry sarse?"

"Bet yer life!" cried Clem.

"Clement McGill Ruggles, do you mean to tell me that you'd say that to a dinner party? I'll give ye one more chance. Mr. Clement, will you take some of the cramb'ry?"

"Yes, marm, thank ye kindly, if you happen ter have any handy."

"Very good, indeed. But they won't give yer two tries to-night, yer jest remembe' that!"

After a few more suggestions, as to table etiquette, Mrs. Ruggles said, "Now, is there anything more ye'd like to practice?"

"If yer tell me one more thing, I can't set up an' eat," said Peter gloomily; "I'm so cram full o' manners now I'm ready to bust, 'thout no dinner at all."

"Me too," chimed in Cornelius.

"Well, I'm sorry for yer both," rejoined Mrs. Ruggles sarcastically; "if the 'mount o' manners yer've got on hand now troubles ye you're dreadful easy hurt! Now, Sarah Maud, after dinner, about once in so often, you must get up 'n' say, 'I guess we'd better be goin';' n' if they say, 'Oh, no, set a while longer,' yer can set; but if they don't say nothin' you've got ter get up 'n' go. Now hev yer got that int' yer head?" Then came the last injunctions and the parting message—"Whatever you do, all of yer, never forget for one second that yer mother was a McGill."

The Christmas dinner was a joyful success for all concerned. Uncle Jack knew how to make everyone feel at home, and there were no bad breaks in manners. As for the "festal board," it can best be described in the words of Susan: "I declare to goodness, there's so much to look at I can't scarcely eat nothin'!" After every little Ruggles had eaten all that a mere mortal can possibly consume, the door of an adjoining room was opened on the spectacle of a wonderful, glittering Christmas tree. There were useful presents, such as hoods, comforters and dresses, and real presents, like dolls and books and toys, and the Ruggleses thought that this was surely a taste of heaven.

That night, after the house was quiet, a boy soprano in the church next door sang in a sweet and tender voice:

I am far frae my hame,
I am weary aften whiles
For the langed-for-hame-bringin'
An' my Faether's welcome smiles;
An' I'll ne'er be fu' content,
Until my e'en do see
The gowden gates o' heaven
In my ain countree.

Even while he sang the loving heart of the little girl next door quietly ceased to beat; the "wee birdie in the great house had flown to its home nest in that 'r countree."

LITERATURE OF CANADA. The literature of Canada may be divided into the period of exploration and discovery; period of settlement; pre-Confederation period; period since Confederation.

The period of discovery and exploration begins with the earliest accounts of those who attempted to plant on the North American continent a new civilization. The very beginnings of this literature lie far back in the old French annals. The chief of these works reach down to the very bedrock of Canadian history. The chronicles of Cartier's voyages; Champlain's narratives; the

histories of Marc L'Escarbot and G. Sogard; the writings of Father Hennepin; the annals of Father le Clerq, and the history by Pierre de Charlevoix are the most important. These furnish the basis of the early literature and are the most important source of history. It is as true of Canada as of any other country, that the development of the institutional life of the country colors the literature of any particular period.

Of the later authors who have written of the early period of Canadian history, mention should be made of the following: Douglas's *Old France in the New World* offers a good survey of Canada in the seventeenth century. The romantic story of Quebec is admirably told in Arthur G. Doughty's *Cradle of New France*. Charles William Colby's *Canadian Types of the Old Régime* treats interesting aspects of French colonization. Colonel William Wood's *Fight for Canada* is a popular and thoroughly accurate account of the conflict between England and France. Sir Alexander Mackenzie's *Voyages*, published in 1802, La France's *Exploration of the Country Adjoining Hudson Bay* (1744), Hearne's *Journeys* (1795), Henry's *Narrative* (1809), and Ross' *Red River Settlement* (1856), discuss in most interesting manner the lives and labors of the period of settlement.

The ax of the settler and the pen of the pioneer alike mark the progress of the settlement of this country. One of the earliest native productions was the *History of Canada* by François Xavier. It holds a very important place in the literature of the country. Biband's *History of Canada Under the French Régime* is a work of much value. With the War of 1812 came a list of writers, many of whom are deserving of notice. Auchinleck wrote the *History of the War of 1812* (1855), and Bouchette gave us *British Dominions in North America* (1831). These writings, numerous and varied, belong directly to the period between that of the settlement and the Confederation.

The fur trade has been so extensive and so vitally connected with the development of the country that we may reasonably expect it to wield an important influence on Canadian literature. This influence has persisted to the present day, especially in fiction and poetry. Especially noteworthy are the novels of Sir Gilbert Parker and the poems of William Henry Drummond. Agnes C. Laut's

Conquest of the Great Northwest and Dr. George Bryce's *Remarkable History of the Hudson's Bay Company* are valuable books of reference which are also of interest to the general reader.

After the Confederation the great North-west came into prominence and there grew up a mass of descriptive and historical literature. The *North-west Passage by Land* by Lord Milton and Mr. Cheodle, *Great Lone Land* by Butler, *Highways from Ocean to Ocean* by Cumberland, *Columbia and Canada* by Rae, *Red River Rebellion* by Huyshe, *The Canadian Dominion* by Marshall, *A Sketch of the North-west of America* by Archbishop Taché, *From Ocean to Ocean* by Rev. George Munro Grant, are a few of the many which are beautifully descriptive of the country.

The Confederation period is rife with a new spirit, and the gradual growth of the literature of this period is worthy of careful study. A Canadian national spirit first asserts itself, and perhaps for the first time a truly national literature crystalizes. Heroic achievement, appreciation of sacrifice, scenery and just pride in home and native land, inspire the author and poet. Not alone do we see the kind of literature which expresses itself in history and adventure and travel, but the literature as expressed in the educational, scientific and political journals of the day deserves attention. The various historical societies are producing a literature distinctly Canadian, yet of such importance that we may say it is sure of universal acknowledgment.

Biography has been devoted mainly to political subjects, especially the statesmen of the period immediately preceding and following Confederation. Among the best of these are Joseph Pope's *Memoirs of Sir John Macdonald*, Sir John Bourinot's *Lord Elgin*, D. C. Scott's *John Graves Simcoe*, Charles Lindsey's *William Lyon Mackenzie* and C. W. New's *Lord Durham*.

In fiction Canada was for a long time far behind the rest of the English-speaking world. There were authoritative historians and famous poets long before any novelists were known outside her borders. Towards the close of the nineteenth century Canadian novelists rapidly came to the front and many of them now rank among the best of English writers. Sir Gilbert Parker easily stands first among contemporary Canadian novel-

ists. Among others who have a secure place are the following: Joanna E. Wood, Sara Jeannette Duncan (Mrs. Everard Cotes), Grant Allen, Robert Barr, P. J. O. Chauveau, James de Mille, Margaret Marshall Saunders, William Kirby, Charles G. D. Roberts and Ralph Connor (Rev. Charles Gordon).

In poetry Canada deserves a high place. Louis Honoré Frechette, who received the laureated approval of the French Academy, and who has been termed the chief of the French-Canadian authors, is, perhaps, the greatest writer produced in this country. Charles Heavysege was the author of *Saul*, probably the most remarkable poem ever written by a Canadian. William Kirby, author of *The Golden Dog*, a fascinating romance of early Quebec, also wrote excellent verse. Charles Sangster, Alexander McLachlan, John Reade and Isabella Valancey Crawford hold high rank among the earlier poets of English-speaking Canada.

Other poets of note are J. J. Proctor, Isidore G. Ascher, Helen M. Johnson, William Murdoch, Evan McCall, Alexander McLaughlin, Marjorie L. C. Pickhall, S. Frances Harrison, William D. Lighthall, Duncan Campbell Scott, Charles G. D. Roberts, Harriet Annie Wilkins, Charles Mair, Bliss Carman, Archibald Lampman, William H. Drummond, Wilson MacDonald and Robert W. Service.

No account of Canadian literature would be complete without reference to two remarkable men, Thomas Chandler Haliburton and Goldwin Smith. Each in his field won a place second to none: Haliburton as a humorist, Smith as publicist. Haliburton's stories, under the pen name of Sam Slick, won for him the place of Canada's greatest humorist. Had he known how to construct a plot he would certainly rank as a great novelist. But he knew human nature in all its phases, and the characters he created live and talk naturally. To read his books merely for their humor is to lose much of their value. Goldwin Smith, on the other hand, as teacher, author and lecturer gained world-wide fame for his influence for progress and sanity, especially in political affairs. Though his views were not always those of the majority, his high standards of thought and action won for him a unique position in the affections of Canadians.

Canadian literature has won a distinct place as one of the productions of the English-speaking race. For a more extended

view of the subject read Lareau's *History of the Literature of Canada*, Dewart's *Selections from Canadian Literature* and G. Mercer Adams' *Outline History of Canadian Literature*.

Related Articles. The following list contains the names of important Canadian writers whose biographies occur in these volumes:

Bengough, John W.	Laut, Agnes C.
Bourinot, John G.,	Lighthall, William D.
Sir	McCrae, John
Bryce, George	Parker, Gilbert, Sir
Carman, Bliss	Roberts, Charles
Cotes, Sara	G. D.
Jeanette	Ross, Alexander
Drummond, William H.	Saunders, Margaret
Duncan, Norman	M.
Duncan, Sara	Service, Robert W.
Jeanette	Seton, Ernest T.
Gordon, Charles W.	Smith, Goldwin
Haliburton, Thomas C.	Traill, Catherine P.

LITHIUM, a metallic element of silver-white luster, that quickly tarnishes in the air. Although lithium may be cut with a knife, it is scarcely as soft as potassium of soda. It fuses at 180° C. and takes fire at a slightly higher temperature. Lithium, which is the lightest of all known metals, floats upon rock oil. It is distributed very widely, but always in small quantities. It forms salts similar to those of potassium and sodium, and these are used extensively in medicine. Effervescing lithium water is sometimes used in place of soda or potash water. The citrate of lithia, whose properties are similar to those of the carbonate, is also used by physicians. On account of the splendid red color they impart to flame, some of the lithium compounds are used in the manufacture of fireworks.

LITHOGRAPHY, *lith og'ra fy*, the art of artistic printing from specially prepared stones. The stone used is a fine-grained limestone of light gray color and is generally known as *lithograph stone*. That of the best quality is obtained in Bavaria, where most of the world's supply is secured.

Lithography is based on the principle that grease and water will not mix, and the preparation of the stone consists in so treating the surface that the portion containing the drawing will retain ink, while the remaining portion will not. The stones are cut into slabs 4 inches thick and varying in size from 6 by 8 inches to 44 by 62 inches. The surface of the stone is ground to a grain resembling that of fine drawing paper or polished with pumice stone, according to the style of print to be made. If the picture is to be drawn with a crayon, the ground surface is used, but if it is to be worked on with a pen, the polished surface is required.

After the stone is prepared, the picture is drawn upon it with a lithograph crayon, just as it appears in the copy, except that it is reversed, like the face of a type. The drawing is then washed with a solution of gum arabic and nitrate of soda, to keep the grease from spreading and to render the other portions of the surface more porous and more capable of absorbing water. After the coating of acid and gum is dried, the stone is washed with water, then with turpentine, which removes all traces of the drawing except the grease from the crayon. The turpentine is then removed by washing with water, and the stone is ready for use. When the picture is engraved on the stone, the work is done in a manner similar to that of engraving steel or copper. See ENGRAVING.

In printing, the stone is first wet with a sponge. The water does not stick to the greased portion constituting the picture, so that part of the surface remains dry while the other is wet. When ink is applied the process is reversed. The ink sticks to the greased surface in such a way as exactly to reproduce the drawing when the paper is pressed upon it, while it leaves the wet surface clean. The printing is done in a cylinder press especially prepared for this work, and transfer plates, made by transferring the picture from the stone to a metal plate, are usually employed. By this means a number of pictures can be impressed upon the same plate, so that by using a large sheet of paper several pictures are produced at each revolution of the press.

Color Lithography. This is the process of producing lithograph pictures in the natural colors of the object and differs from ordinary lithography only in the elaboration of the process. First, a good plate or stone is made, which contains the complete outline of the picture. This plate contains registering marks on each of its margins, and all of the other plates must be made to register accurately with it. Each color requires a special plate, and the final effect is produced by printing in the right order the different colors required. This order is usually yellow, red, brown or gray, blue and then the tints of any other colors necessary.

Lithography reproduces art work of a high order of excellence and is often employed to reproduce in a comparatively inexpensive way paintings and other works of the old masters. It is also used in the production

of colored pictures when results finer than those which halftones can produce are required.

LITHUANIA, an independent republic in Europe, on the Baltic, between Latvia and Poland. It was one of the five new nations formed from Russian territory after the World War, on the basis of "self-determination of peoples," the other being Finland, Estonia, Latvia, and Poland. It lies south of Latvia, with Soviet Russia on the east and south; East Prussia is also on the south; the Baltic Sea is west. When organization of the country was effected, Vilna was made the capital city, but in 1923 a council of ambassadors, under direction of the League of Nations, settled a territorial dispute between Lithuania and Poland, and gave Vilna and surrounding territory to Poland. This brought the two countries nearly to war; temporarily the Lithuanians transferred their capital to Kaunas (before known as Kovno), and that city will doubtless remain the seat of government, for the cession to Poland appears to be permanent. The area of the country, excluding the Polish cession (10,400 square miles) under dispute, is 21,488 square miles; population, 1934, 2,471,000. The population of Kaunas is 102,750.

The People. Lithuanians represent about eighty per cent of the population; the next most numerous nationalities are Jews, who number 155,000, with Poles, Germans, and Letts following in order. There are more than a million Lithuanians in other European states, principally in Poland. The Lithuanian is one of the oldest living languages in Europe.

The Land and Its Resources. With the exception of a region of hills in the southeast, it is a country of lowlands, sloping to sea level in the west. Only a fourth is forest area; the remainder is largely available for agriculture. The usual temperate zone crops are harvested, mainly wheat, rye, oats, barley, flax, and potatoes. Under the former Russian rule, the land was held largely in vast estates, but these were broken up, that peasants might have opportunity to become proprietors of small farms not exceeding 50 acres, purchase to be made in products of the soil covering a period of thirty-six years. There are few minerals.

Government. Lithuania was recognized as a republic in 1920. The chief executive is a President, elected for seven years by chosen

representatives of the nation; there is a Parliament (Seimas) of one chamber, elected for five years by all people of voting age, which is twenty-four years.

History. In the fourteenth century Lithuania was a duchy of the then powerful Poland; this was brought about through the marriage of a Lithuanian grand duke and the Polish queen Hedwig. Powerful neighbors east and west, Russia and Prussia, within the next three hundred years divided the two countries between themselves. Lithuania fell to Russia, and from 1795 to 1915 it was a misgoverned province. In the latter year Germany occupied it by conquest, intending to make it a German dependency after German success in the war was achieved. Later history is recorded in the first paragraph of this article.

LITMUS, a peculiar coloring matter, procured from lichens. Paper tinged blue by litmus is reddened by the feeblest acids and hence is used as a test for the presence of acids. Litmus paper which has been reddened by an acid will be turned blue again by an alkali. Hence the paper is indispensable in chemical laboratories.

LITTLE ENTENTE, a political alliance for common security and an economic union for mutual benefit entered into in 1921-1922 by Rumania, Jugo-Slavia and Czechoslovakia. The Little Entente looks to France for political support.

LITTLE ROCK, ARK., the capital of the state and its largest city and the county seat of Pulaski County, situated in the geographical center of the state, about 130 miles southwest of Memphis, Tenn., on the Arkansas River and on the Chicago, Rock Island & Pacific, the Saint Louis Southwestern, and the Missouri Pacific railroads. North of the river is an airport. The city is on a rocky bluff about fifty feet above the river. The new capitol is the most prominent building, and there are, besides this, Federal buildings, a state arsenal and penitentiary, a county courthouse and state supreme court and Carnegie libraries and Saint Andrews' Cathedral. The city contains also the Marquand, state and several collegiate libraries. Among the educational institutions are the Philander Smith College (Methodist), Arkansas Baptist College, Shorter College (colored), Arkansas Military College, Little Rock College, Arkansas Law School, and Dunbar Junior College. The charitable institutions include a Confed-

erate soldiers' home, a state asylum for the insane, the Saint Vincent's Infirmary, the Old Ladies' Home, a county hospital and a children's home. There are over 400 acres in public parks. Population, 1930, 81,679.

LITURGY, *lit'ur jy*, the form of worship in the celebration of the Lord's Supper, which is in general the same in all Churches. The first part of the service consists of Scripture reading, sermon and prayers; the second, of prayers and the offering of the consecrated bread and wine. The Book of Common Prayer contains the form of communion service used in the churches of the Anglican communion. The liturgies of the Eastern churches have been named the *Syrian rite*, still used by the Maronite Church, the *Persian rite*, now used by the Nestorians; the *Byzantine rite*, used in many parts of the world and by the Greek and Russian churches; the *Egyptian rite*, a version of which is used by the Copts. The Western liturgies are the Roman mass, called the Latin liturgy, and that of Protestant churches, known as the vernacular, which grew out of the Reformation.

LITVINOV, MAXIM (1876—), a Russian revolutionist, condemned under Czarist rule and compelled to flee to Switzerland for safety, who became one of the leading officials of Soviet Russia. When Lenin and Trotsky overthrew the moderate Kerensky government that succeeded the autocracy of Nicholas II, Litvinov returned home and joined the Communistic leaders in the Soviet government. Under the leadership of Stalin, he became People's Commissar for Foreign Affairs. It was Litvinov who visited the United States in 1934 and persuaded the President to grant recognition to Russia as a member of the family of nations.

LIU-CHIU, LU-CHU, LIU-KIU, *lyoo kyoo*. See LOO-CHOO.

LIVE-FOREVER. See HOUSELEEK.

LIVER, the gland which secretes bile. In man, the liver is situated just below the diaphragm, on the right side, extending across the middle line of the body toward the left. (For picture, see illustration accompanying the article ABDOMEN.)

From its position it is liable to compression and injury. In its general form the liver is flat, broad and thick toward the right side, becoming narrow and thin toward the left. Its upper surface is convex or arched and fits into the concave surface of the dia-

phragm, while its lower surface is irregularly divided into lobes, five in number, separated by clefts, or fissures. In texture it is soft and easily crumbled. Its color is a dark reddish-brown.

An important function of the liver is the separation of waste matter from the blood, and the changing of sugar into a starch called *glycogen*. The liver also makes bile. The liver is supplied with blood by the hepatic artery. The portal vein carries to it the venous blood from the intestines, spleen and stomach, and after this blood circulates through the cells of the liver it is carried by the hepatic veins to the inferior vena cava. The bile secreted in the liver is carried by the hepatic duct to the gall bladder, a little pear-shaped sac on the under side of the liver, where it is stored when digestion is not going on; during digestion it is poured directly into the duodenum.

Related Subjects. Consult the following titles for additional information:

Bile	Circulation	Digestion
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LIVERMORE, MARY ASHTON RICE (1821-1905), an American reformer, born in Boston. She early was active in the anti-slavery and temperance reform movements and during the Civil War gained special fame by her unselfish relief service for the Union soldiers. After the war she lectured upon moral and social problems, and was a powerful advocate of temperance and woman suffrage. She was at one time editor of a woman's journal in Boston and was the author of numerous books.

LIVERPOOL, ENGLAND, the third city and the second seaport of the United Kingdom, in size next to Birmingham. It is situated on the River Mersey, three miles from its mouth, thirty miles southeast of Manchester and 201 miles northwest of London.

The city is built on a bend in the river, which gives it a semicircular water front between six and seven miles in extent. From this level the land rises gradually to an altitude of 250 feet. The main streets lead from the water front to different parts of the city. The newer and better part of the town is on the highland back from the river. Here are located some of the finest public buildings in the world. Chief among these is Saint George's Hall, constructed from the profits arising from the docks, and used for various purposes. It contains a large audience room, which has one of the largest

organs in the world; it also has other apartments used for public gatherings and educational purposes. Around this building or near by are located the free library, the Walker Fine Art Gallery and the Picton Lecture Hall, with a large reference library, the Lime Street railroad station and the great theaters. The town hall is a fine building, begun in 1754. The city maintains a large number of hospitals and other charitable institutions, designed to meet all the wants of its inhabitants. Nearly all of the public utilities, such as waterworks, lights, tramways or street cars, are owned and operated by the municipality.

Liverpool has a more extensive foreign commerce than any other port in the United Kingdom, and the docks, which extend along the river for nearly seven miles and contain over twenty-four miles of wharfage, are the chief objects of interest. Near the center of the line of docks is an immense floating dock, supported on pontoon boats. This is 2,060 feet long and is connected with the mainland by eight bridges. Here most of the passenger steamers land. The docks have been constructed at great expense and include basins which are enclosed by gates, so that vessels loading or unloading are not affected by the change of tide. Nearly all of the cotton, grain, dressed meat and other produce shipped from Australia, Canada and the United States to England enter through the port of Liverpool; likewise most of the exports from the United Kingdom to these countries leave from this port. Population, 1931, 855,539.

Related Articles. Consult the following titles for additional information:

Board of Trade Dock Mersey River

LIVERWORTS, *liv'ur wurts*, a group of plants forming one of the two suborders of the *bryophytes*, the other including the mosses. Liverworts grow in various places, though they are commonly found in moist regions. The name refers to the shape of the plants, which are flat, lobed and leaf-like, somewhat resembling the liver of the human body. Liverworts are attached to objects by small rootlets. See *BRYOPHYTES*.

LIVINGSTONE, *liv'ing stun*, DAVID (1813-1873), a missionary and African traveler, born at Blantyre, in Scotland. Under the auspices of the London Missionary Society he went in 1840 as medical missionary to South Africa, where he joined

Robert Moffat, who had been working among the natives of Bechuanaland, at Kuruman, for twenty years. Livingstone subsequently married Moffat's daughter Mary. He felt that the opening up of the continent was a necessary step in the Christianizing of the natives, and during the next few years he was both explorer and missionary. Between 1840 and 1852 he established several stations, explored the region north of the Kalahari Desert, discovered Lake Ngami and made his way south to Cape Town. In 1852, having sent his wife and children to England, Livingstone undertook the exploration of the upper lakes of the Zambezi River, which he reached in 1854. He was the first European to see this stream. Turning west, he arrived at Loanda, on the Atlantic. He then returned to Linyanti, from which, in 1855, he struck eastward, tracing the Zambezi to the Indian Ocean and thus completing the crossing of the entire continent. The record of this journey is found in his *Missionary Travels and Researches in South Africa*, published in London in 1857.

In 1858 he was placed in command of an expedition for the exploration of Eastern and Central Africa, and during this expedition he discovered lakes Shirwa and Nyassa. Seven years later he started out to set at rest the question of the sources of the Nile, and from this time until his death he was engaged in laborious explorations in the lake region of South Africa, especially to the westward of Nyassa and Tanganyika, where he discovered lakes Moero and Bangweolo. For about three years no communication from him reached the outer world, and doubts regarding his safety were set at rest only when it was known that Henry M. Stanley, the correspondent of the *New York Herald*, had seen and assisted him at Ujiji, on Lake Tanganyika. They parted in March, 1872, Livingstone going to explore the southern end of Lake Tanganyika and Stanley proceeding to Zanzibar. Another year's hardships completely exhausted Livingstone, and he died in May, 1873, near Lake Bangweolo. His body was taken to England and was buried in Westminster Abbey. He was the author of *Missionary Travels and Researches in South Africa* and *The Zambezi and Its Tributaries*. Consult Stanley's *How I Found Livingstone* and Hughes's *David Livingstone*.

LIVIOUS, the common designation of Livius Andronicus (about 290-about 205 B. C.), was the earliest epic and dramatic Roman poet of note. By birth he was a Greek, but he became a prisoner in the Tarentine wars, and Pyrrhus carried him to Rome. He was sold as a slave to a man named Livius, and to this fact is due the name by which he was known after Livius freed him. The young man learned Latin and became a teacher and a writer of tragedies, hymns and comedies. Only fragments of these have been preserved.

LIVO'NIA or **LETTVIA**, was Livonia only from the date of its independence from Russia until the final determination of its boundaries in 1920, when it organized a permanent government, republican in form, and became Latvia. The area of the present state is 24,400 square miles; population, 1930, 1,900,000. Riga is the capital; population, 377,917. Three small islands in the Baltic Sea, Oesel, Moon, and Rundo, belong to the country. Latvia, "the home of the Letts," has a German minority.

In the year 1917, after the downfall of the czarist régime, Livonia set up an independent government, but early in 1918 this was overthrown by the Germans, who, after imposing on Russia the Treaty of Brest-Litovsk, sought to erect German principalities in the Baltic provinces. When Germany itself surrendered to the entente in November, 1918, the German forces were withdrawn from Livonia, but the people were not left undisturbed. In 1919 a Bolshevik army was sent against them to force the establishment of a Soviet government, and for months afterward there was serious fighting between Esths and Letts on the one hand and the "Red Guards" on the other. Peace was established early in 1920, and Lettvia, changing its name to Latvia, became independent. An alliance was at once suggested between Latvia on the one hand, and Courland and Esthonia, on the other; the latter two are neighboring small powers always in danger from their neighbors on three sides. It was desired to establish a basis of mutual helpfulness and protection in event of future threatening political events. An agreement was finally reached, the larger part of Courland joining Latvia, the rest, Lithuania. See **RUSSIA**; **WORLD WAR**. **ESTHONIA**; **LATVIA**.

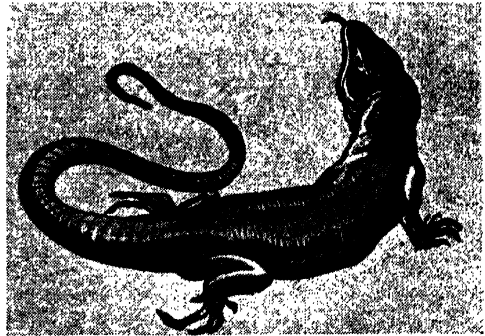
LIVRE, *le'vr'*, a former French coin about equal in value to the franc, which super-

seded it in 1795. The livre was also an ancient unit of weight, equal to about 17½ ounces avoirdupois.

LIV'Y, (59 B. C.-A. D. 17) whose name in full was **TITUS LIVIUS**, was a celebrated Roman historian. Nothing is known of his life except that he was born at Patavium (Padua), that he went to Rome, secured the favor of Augustus and became a person of some consequence at court; that he was married and had at least two children, and that he died in his native town. His history of Rome consisted of 140 or 142 books, of which we have only thirty-five. Of all the books except two, however, we possess short epitomes or tables of contents. Livy did not claim to be a critical historian; his purpose was to glorify his country.

Livy has been accorded first place among historians of the Augustan Age in the ancient Roman world. While not always accurate in his statements he aimed at the truth and endeavored from the facts presented to draw lessons for the benefit of his countrymen. He touched lightly the social evils of the times, and made no attempt to prove or disprove much that was legendary.

LIZ'ARD, the popular English name of numerous reptiles, which have usually two pairs of limbs and a long body terminating



LIZARD

in a tail. The lizards number about two thousand species and accommodate themselves to all conditions except cold. In the tropics they are numerous and large. Some lizards feed on vegetables, but for the most part they live upon small birds and insects. Lizards lay their eggs in the sand and abandon them. The chief families of the species are the skinks, the geckos, iguanas and the chameleons.

Poison glands are wanting in all lizards excepting in the Gila monster of Arizona and Mexico, which is capable of inflicting a dangerous bite.

Related Subjects. Consult the following titles for additional information:

Basilisk	Horned Toad
Gila Monster	Monitor

LLAMA, *lah'mah*, the only beast of burden in South America before the introduction of horses and mules. It is a cud-chewing animal, closely allied to the camel, and has the same mild, docile traits. The llama



LLAMA

has the general appearance of a long-necked sheep, standing about three feet at the shoulder. Of the four known species, the guanaco and the vicuña are found in a wild condition, while the llama and the alpaca have long been domesticated. The llama can travel about fourteen miles a day across the mountain passes. In Peru and Bolivia it is man's main dependence for transportation of burdens.

LLANOS, *lyah'nose*, the Spanish name given to the vast plains situated in the northern part of South America, particularly in Columbia and the basin of the Orinoco. During the dry season the vegetation is burned by the sun, while in the rainy period the regions are flooded with water. Between these two seasons they are covered with thick grass and ranged by vast herds of cattle and horses. Farther south, such plains are called *pampas*. See PLAIN.

LLOYD GEORGE, DAVID. See GEORGE, DAVID LLOYD.

LLOYDS, the world's most famous marine insurance association, whose headquarters are in London. It derived its name from Lloyd's Coffee House, where the members were at first accustomed to meet. Members are admitted by subscription. Lloyds now accepts many kinds of insurance risks, as a singer's voice or a dancer's foot; it will even insure a great merchant against inclement weather on a sale day.

LOAM, *lome*, a soil compounded chiefly of sand, clay, carbonate of lime or chalk and decayed vegetable and animal matter. Loam soils are valuable for raising crops. See SOIL.

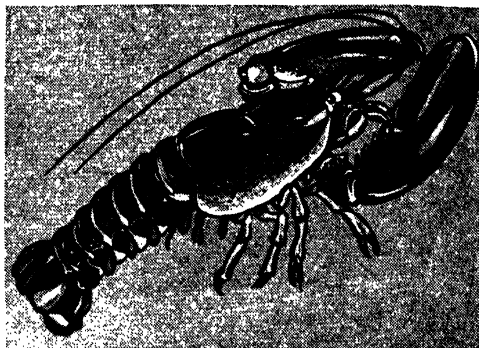
LOBBY AND LOBBYING. As related to government affairs, a lobby comprises persons who are continually found in the lobbies or outer halls of legislative bodies, and who seek to influence the trend of legislation. As a matter of fact, any citizen has the right to protest against the passage of a proposed law; it is also his privilege to promote the passage of a law by all proper means.

A person seeking occasionally to influence legislation cannot be called a lobbyist, but there are persons who make a business of lobbying, and some of these have brought discredit upon enterprises which are often worthy. If a man or woman, for compensation, seeks by argument, influence, wiles or money to control votes of legislators, such a person is purely a lobbyist—within legal rights, if the only weapon used is logic, but subject to severe condemnation and punishment if questionable methods are employed.

LOBELIA, an extensive genus of beautiful herbs, which are natives of almost all parts of the world and especially of the warmer portions of America. Several species grow wild in the United States. The most brilliant of these is the cardinal flower that forms so conspicuous a feature in swamps in late summer and autumn. A large, blue-flowered variety is almost as brilliant. Many tropical species are cultivated in hothouses because of their great beauty. All of the plants are more or less poisonous.

LOB'STER, one of the most singularly-formed members of the animal kingdom, called a crustacean by the scientist because it is invested with an outer hard, shell-like surface, or crust. As a crustacean, the lobster is related to the shrimp, crab, barnacle, etc.

The body of the lobster has seven distinct segments, while thirteen minor ones, which



THE LOBSTER

form the thorax and head, are so blended together as not to be easily distinguished. The animal has two pairs of antennae and six pairs of mouth organs. The first pair of legs is long and terminates in large claws, one of which is thick and very heavy and is used for crushing objects. The other claw is shorter, smaller, more or less curved, toothed and pointed at the tip. The claws are really pinchers, which can be closed when fighting or when the animal seizes its prey. The tail is composed of the last segment and has two wide appendages on each side, making a broad incurved organ, which the animal uses in swimming. By straightening this tail and drawing it forcibly under, the lobster is thrown backward through the water at a rapid rate.

The animal has two large, compound eyes, situated at the end of thick stocks. Its senses of hearing and sight are keen. The female carries her eggs on the under side of the abdomen until they hatch, when the young are driven away and for a time swim about freely near the surface. After about a month they descend to the bottom, where they remain. The lobster lives on the bottom of the sea and rarely rises more than a few feet from it. It walks about on the tips of its legs, extending the large claws forward and pushing itself along by the swimming feet.

Lobsters are highly esteemed for food. They are caught in *pots*, which are traps made of wood, sunk among the rocks in the clear water in which the animals live. The pots have a funnel-shaped opening and are baited with fresh meat, which attracts the

lobsters. When they have once entered the trap they are unable to escape. When taken from the water the lobster has a greenish appearance. The brilliant red color of those placed upon the market is produced by boiling.

Eastern Canada finds the lobster industry a prime source of wealth. Nova Scotia leads, with Prince Edward Island and New Brunswick in second and third places; Quebec ranks sixth in importance in North America, Maine and Massachusetts surpassing its annual catch. Rhode Island follows Quebec. In Europe, France's lobster beds are the most extensive.

Related Articles. Consult the following topics for additional information:
Crab Crustacea Shrimp

LO'CAL OPTION, a term applied to the principle by which a certain majority of the inhabitants or taxpayers of a definite locality for many years decided whether liquor might be sold in their communities.

The local option principle was applied to villages, to cities, to townships or to counties, as state laws directed.

Related Articles. Consult the following titles for additional information:
License Prohibition Temperance

LOCARNO CONFERENCE, a meeting in Locarno, Switzerland, that isle of peace in troubled Europe, participated in by representatives of Great Britain, France, Germany, Belgium, Italy, Poland, and Czechoslovakia, in 1925. Its object was to reach understandings which would make impossible another great war. There was signed one general treaty by the first five powers named, called the Rhineland Security Compact. Its chief provisions were that (1) Germany and France agreed never to fight each other again; (2) Germany agreed to join the League of Nations; (3) Germany consented to a neutral zone, with the River Rhine as its center, where Germany touches Belgium and France; (4) the safety of the frontier was guaranteed, with the powers promising aid to the invaded country if either France or Germany should attack the other. In addition, Germany signed arbitration agreements with France, Belgium, Poland, and Czechoslovakia.

This conference was momentous in the history of Europe. For more than ten years it remained the chief reliance of the powers for peace. In 1936 the Hitler government of Germany renounced the Rhineland Compact

and sent troops to occupy the neutral zone, their guns facing the French border. Great Britain and France realized this to be a threat to peace on the continent, and tried to persuade Germany not to fortify the area. Their efforts were fruitless.

LOCK, an arrangement for fastening doors, chests, drawers and the like. It is so made that it cannot

be worked except by the key or knob especially fitted to it. The simplest lock contains a bolt, a staple into which the bolt locks,

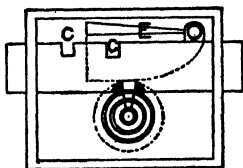


FIG. 1

and a spring which prevents the bolt from being moved without the key. The bolt has a rounded notch on the under side, into which the key fits. On the upper side are two square notches, *CC*, which are as far apart as the bolt moves. Back of the bolt and fastened to the frame by a pivot, is a tumbler, indicated by the dotted lines in Fig. 1. On the end of the tumbler is a square piece of metal, *E*, which drops into the notches, *CC*, as the bolt is locked or unlocked. This plug is pressed down upon the bolt by a spring attached to the frame and the other side of the bolt. The whole arrangement is enclosed in an iron frame. On the inside of the frame are curved ridges, called *wards*. Slots are cut into the key so as exactly to fit these wards, and by this arrangement each lock is protected so that it cannot be opened or closed by any key but the one made specially for it. In Fig. 2 is shown a lock with a number of tumblers,

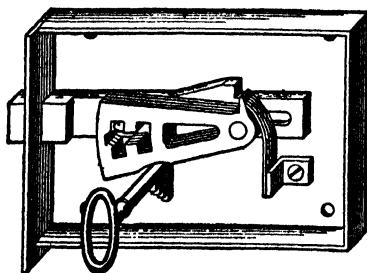


FIG. 2

which make it more complicated and more difficult to be opened with any key except its own. Formerly locks of this pattern were in general use on stores and other public buildings, but they have now been almost entirely replaced by the Yale lock, named

from its inventor, Linus Yale. This has a flat key with noches on one edge, which fit a number of pin tumblers that move up and down. It is practically impossible to open this lock with any key except the one designed for it.

LOCK, in engineering, a device in a canal for raising or lowering boats from one level to another. A lock is a chamber whose side walls are made of stone or concrete and whose ends are closed by a pair of folding gates. The gates in each pair are called *leaves*. When closed, the leaves form a V-shaped partition across the chamber, with the vertex pointing up stream. This enables the gates to withstand the pressure of the water in the lock. When a boat is to be locked from a lower to a higher level, the gates at the upper end of the chamber are closed and those at the lower end are opened. This leaves the water in the chamber at the same level as that in the lower level of the canal. The boat passes into the chamber, and the lower gates are closed. By means of valves in the gates at the upper end or in the sides or bottom of the chamber, the water is gradually let into the lock until the boat is raised to the upper level of the canal. The gates at the upper end of the lock are then opened and the boat passes out. When the boat is lowered, the operations are reversed. In large locks the gates and valves are operated by machinery. See CANAL; PANAMA CANAL.

LOCKE, JOHN (1632-1704), one of the most influential of English philosophers, born at Wrington, in Somersetshire. He was educated at Westminster School and Christ Church College, Oxford, after which he applied himself to the study of medicine. Later he became secretary to the Earl of Shaftesbury and was assigned the task of drawing up a constitution for the Carolinas, of which the earl was one of the proprietors. His attempt, known as the Grand Model, was a failure, because it was based upon a feudal aristocracy, which was wholly impracticable in a new country. Later he published his *Essay Concerning Human Understanding*, a work which attracted wide attention and at once gave him a place among the foremost thinkers of his time. The theory upon which he based his system is that there are no inborn ideas, and that all experience is the result of impressions made on the mind by external objects.

LOCKJAW. See TETANUS.

LOCK'OUT, the name applied to a condition resulting from an employer's refusal to continue a body of workmen in his employ. It results because of demands by them which he can not or will not concede. The lockout is really a strike, but on the part of the employer rather than by the employees. In both cases the effect is the same.

Related Articles. Consult the following titles for additional information:

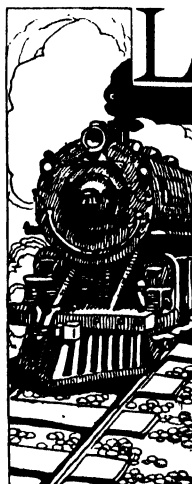
Arbitration Labor Organizations Strike

LOCK'PORT, N. Y., the county seat of Niagara County, twenty-five miles northeast of Buffalo, on the New York State Barge Canal, and on the New York Central, the Erie and the International railroads. The canal here has a series of five locks, electrically operated, with a lift of twelve feet each. Near the city are extensive quarries of limestone and sandstone, and the principal manufactures are waterworks machinery, milling and woodworking machinery, pulp, paper, glass, brooms and textiles. The city has a large trade in grain and fruits from the surrounding agricultural region. The prominent buildings are an Odd Fellows' Home, a Federal building and courthouse and jail. The place was settled in 1823 by workmen on the Erie Canal. It was incorporated in 1829, was chartered as a city in 1865. Population, 1920, 21,308; in 1930, 23,160, a gain of 9 per cent.

LOCK'WOOD, BELVA ANN BENNETT (1830-1917), an American lawyer and reformer, born at Royalton, N. Y. She graduated at Genesee College, Lima, N. Y., taught school for some years, afterward studied law and was admitted to the bar in Washington in 1873. After laboring for the passage of a law admitting women to practice before the Supreme Court, she herself was admitted to that practice. Mrs. Lockwood was afterward conspicuous in agitation for woman suffrage and was nominated for President of the United States in 1884 and 1888 by the Equal Rights Party. She was also active in the movement for international peace.

LO'OO-FO'OO, a name given to a faction of the Democratic party in New York state in 1835, which demanded the rechartering of the United States bank and was opposed to the chartering of state and private banks by special legislation. The faction received its name from an occurrence at a mass meet-

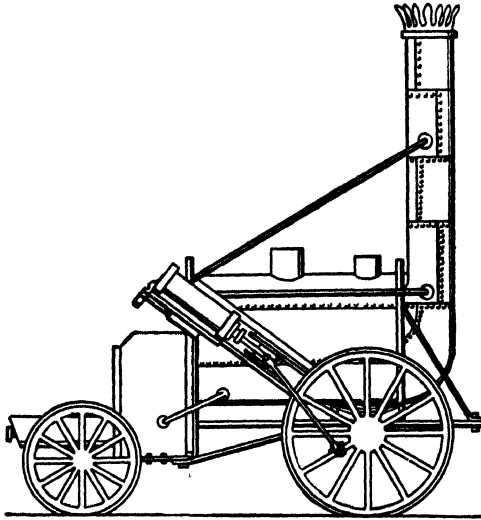
ing held at Tammany Hall, New York, in October, 1835. The organization Democrats attempted to control the meeting, but being unsuccessful, they turned out the lights and retired. The victors, however, had supplied themselves with friction matches, which were at the time called loco-focos, and, lighting candles, proceeded to transact their business. The regular Democratic press soon took up the incident and dubbed the faction *loco-focos*. Eventually the Whigs applied this name to the Democratic party throughout the country. The faction was finally absorbed into the original organization, through the efforts of President Van Buren.



LOCOMOTIVE, *lo ko mo' tive*, a railway engine, to the invention of which is credited much of modern progress. The history of its development is a romance of commerce and mechanic art which has few parallels in the record of human achievements. The locomotive resulted from the pinch of necessity for means of transporting the products of the mines to ships, yet those who sought to construct a steam engine to run on a track were called visionaries. Many people at first called the clumsy invention a crime; the puffing, noisy contrivance disturbed the peace, and its terrific speed of fifteen miles per hour endangered public safety. It is recorded that when the locomotive first appeared in England a man on horseback was required to precede it to warn the public of approaching danger. If the *Rocket* (see next page), and the *Puffing Billy* and the first Baldwin were "crimes," the monster locomotives of the present day, which weigh from 300 to 425 tons, doubtless would have appeared to the fearful folks of 1829 as a dastardly outrage against public peace and security.

Earliest Locomotives. The first successful attempt to construct a self-propelling engine was by a Frenchman named Cugnot in 1796, but the railway locomotive was invented by Richard Trevithick, a Cornish miner, in 1804. While this locomotive was considered a failure commercially, it con-

tained most of the important features successfully used in later patterns. The success of the locomotive is due to George Stephenson, an English engineer. In 1829, at a



THE "ROCKET"

competitive trial of several locomotives on the Liverpool & Manchester railway, Stephenson's engine, the *Rocket*, was the most successful, and many others were patterned after it. This engine was mounted on four wheels, and had a horizontal boiler 6 feet in length and 5 feet 4 inches in diameter, which contained 25 tubes, each 3 inches in diameter. When ready for use this engine weighed $4\frac{1}{2}$ tons, and with the tender, $7\frac{1}{2}$ tons. On its trial trip it hauled a load weighing over nine tons at a speed of twenty miles per hour, and on another trip it reached a speed of nearly thirty miles per hour. The success of this locomotive demonstrated the practicability of steam power for railways.

The first locomotives used in the United States were imported from England, but in 1830 one was built at the West Point foundry, and others soon followed. The early American engines copied the English patterns very closely, but the conditions to be met upon American railways made it necessary to deviate from the English type, and soon a distinct type of American locomotive was developed, which, with various modifications and enlargements necessary to meet the constantly growing traffic, is still in general use.

Essential Parts. A locomotive consists of a steam boiler of the tubular type (see **BOILER**), a pair of simple or compound engines, a running gear and a wrought iron frame, on which the various parts are so mounted that the engine can travel upon a track. The accessory parts are the *smokestack*, or *chimney*; the *pilot*, often called the *cowcatcher* by boys and girls, for knocking objects off the track; the *cab*, for sheltering the engine-men; the *tender*, for carrying fuel and water; the *injector*, for forcing water into the boiler; the *air brake pump* and necessary appliances; the *sand dome*, the *bell*, the *whistle*, *steam gauges*, *water gauges*, the *safety valve*, and equipment for electric lighting.

The common type of American locomotive has a horizontal boiler; four, six, eight or even a greater number of main drive wheels, from four feet five inches to six feet five inches in diameter, and connected on each side of the engine by a bar joined to the pistons by connecting rods. The forward end of the machine rests upon a truck of four, six or eight small wheels, and the tender usually has eight to twelve wheels arranged in two trucks. The wheels of freight locomotives are smaller than those of passenger locomotives, since in the freight engine great traction power is desired, while speed is not as essential. Large passenger engines, especially those designed for heavy grades, have six drive wheels, and if the engine is designed for high speed, the wheels are six or more feet in diameter. Every device for controlling the locomotive is within easy reach of the engineer, so that by pulling a lever he opens the throttle valve and admits the steam, or by pushing it from him he closes the valve and shuts off the steam.

The weight of passenger locomotives ranged from sixty to seventy tons in the older patterns, to as high as 300 and even 400 tons, in the newer models of special design for mountain climbing, while the largest freight engines weigh over 500 tons. The cost of a modern engine ranges from \$18,000 to \$25,000, and its life is about thirty years.

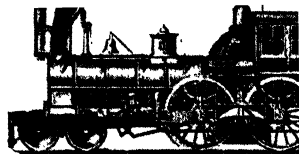
Stream-Lined Locomotives. Ordinary trains are very heavy, are operated at great cost, and cannot attain the speed and provide the comfortable accessories this modern, fastidious age demands. For a number of years railroads found they were losing passenger business to the airplane, motorbus, and auto-



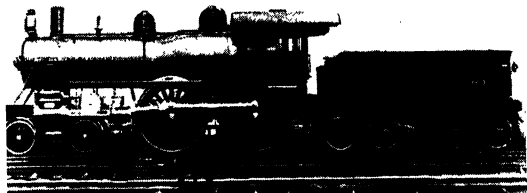
1870



1831



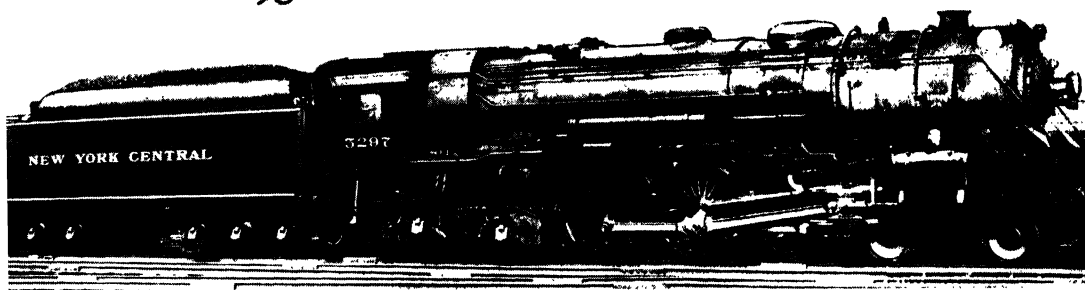
1851



1893



1920



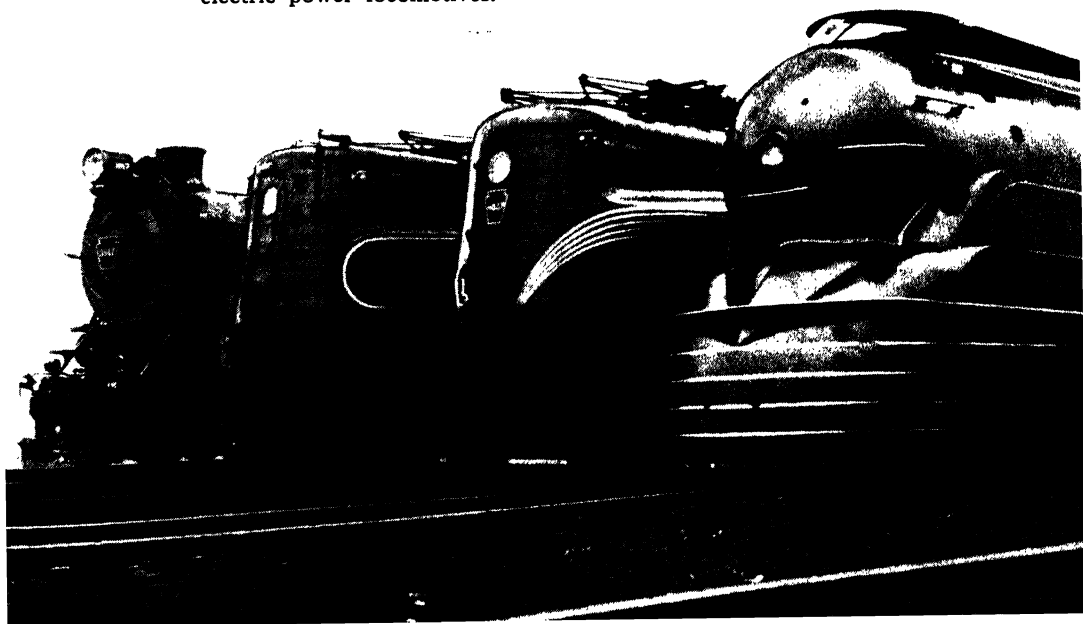
New York Central Lines

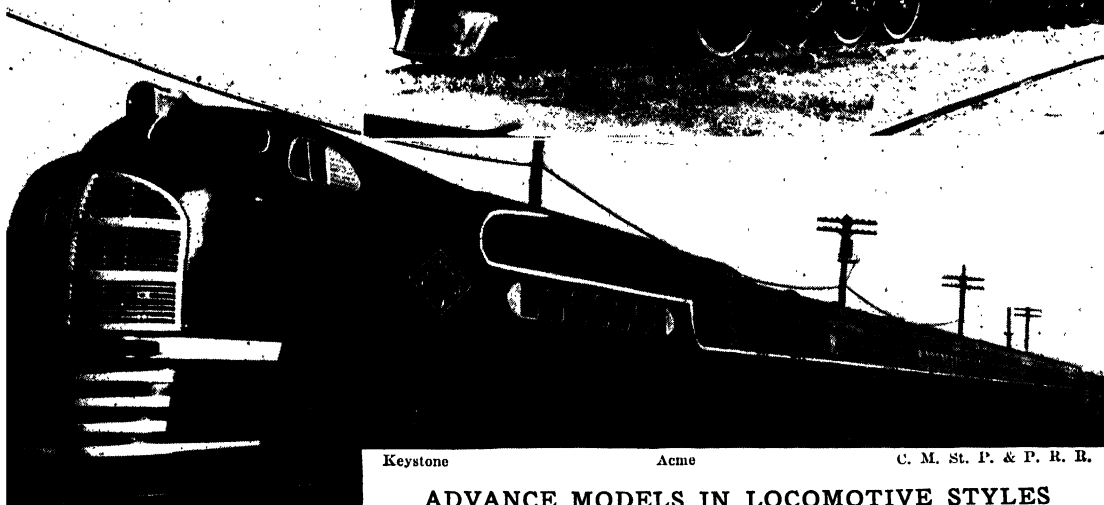
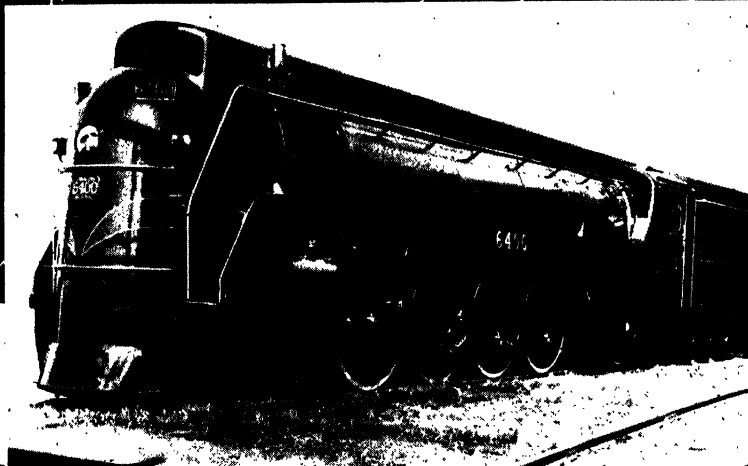
Acme

PAST, PRESENT, AND FUTURE

1931

Only three generations of New York Central engineers were needed to develop the steam locomotive from the famous "DeWitt Clinton" (1831, above) to the monster Hudson Type of 1931. The first and fourth locomotives below represent the familiar old-style and new stream-lined steam locomotive of the Pennsylvania Railroad; the second and third show that road's old-style and new stream-lined electric power locomotives.





Keystone

Acme

C. M. St. P. & P. R. R.

ADVANCE MODELS IN LOCOMOTIVE STYLES

From top to bottom: A French stream-lined train entering Paris. Canada is proud of the world's largest stream-lined steam locomotive; with tender, more than 94 feet long. Illinois Central's "Green Diamond," powered by Diesel engines. The new "Hiawatha" of the Chicago, Milwaukee, Saint Paul & Pacific Railroad.



mobile, newer and popular modes of transportation. It was essential through a somewhat revolutionary movement to demonstrate the railroads' ability to cope with the problems arising from competition. Strangely, the automobile provided the first suggestion. Automotive designers evolved the streamlined car, which reduced wind resistance, made greater speed possible, and lessened the cost of motor fuel per mile.

Metallurgical science produced lighter substances than iron and common steel, without sacrifice of strength. Following the trend of inventive genius, engineers have designed light streamlined locomotives capable of sustained speeds of 80 to 110 miles per hour, have built passenger cars to match them in weight, and have equipped them with power plants of new type. While on some of the new locomotives coal is the fuel used, the most popular designs have oil-burners or Diesel-electric engines. A locomotive with Diesel power, pulling three cars, made a run across the continent in record time at a fuel cost of \$80. The first Diesel-powered locomotive ever built in America, the *Zephyr* of the Burlington route, made a trip from Denver to Chicago in 13 hours, 5 minutes; the regular service required 23 hours, 45 minutes.

The standard new-type train, locomotive and three cars, weighs about 230 tons, a reduction of one-half in weight. The frames are built of light-weight rust-resisting steel containing chromium, copper, and silicon; the bodies are largely aluminum. Each of these ultra-modern trains is air-conditioned; kitchens are completely electrically equipped. The cost of such a train is about \$400,000.

A few of the great railroad companies have put trains of this new type in operation between key cities, and others will follow the pace set by the pioneers. However, the old-style locomotive for years will be found in service, for hundreds of millions of dollars are invested in equipment which, while becoming obsolete in this new day, cannot be discarded until it deteriorates.

Electric Locomotives. Locomotives in which electric power is substituted for steam have been successfully operated for a number of years on suburban railroad trains, and since 1915 over even difficult lines of mountain road. The most notable electrification of both freight and passenger service is on the Chicago, Milwaukee, Saint Paul &

Pacific Railroad in Montana and Idaho. Engines are employed which are 112 feet 8 inches in length; each is equipped with motors which develop nearly 3,500 horse power. The current is diverted to the motors by overhead feed wires, similar to those of the familiar city trolley lines.

For suburban service both trolley lines and third-rail systems are employed. As no steam locomotives are permitted on Manhattan Island, New York City, all trains entering there are motor driven. The New York, New Haven & Hartford Railroad uses electric locomotives on its entire suburban service; the other railroad companies detach their steam engines and attach electric locomotives to all trains before entering the city. The average electric locomotive weighs 110 to 125 tons, and is equipped with eight to twelve motors each developing 300 to 325 horse power.

Related Articles. Consult the following titles for additional information:

Air Brake	Steam Engine
Electric Motor	Stephenson, George
Railroad	Transportation
Steam	Westinghouse, George

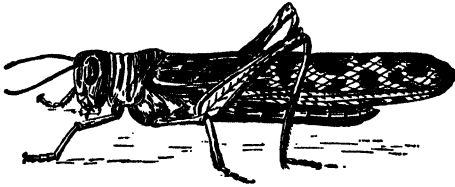
LOCOMOTOR ATAXIA, a disease of the nervous system, characterized by a loss of the power to move the muscles harmoniously. It is not paralysis, for the person is able to move and even to walk. He walks, however, with a peculiar halting gait, during which he often falls, because the limbs will not move together. The approach of the disease is slow and long continued, and is often accompanied by partial paralysis. The disease usually continues to a fatal termination, though it is sometimes stopped if treatment, directed by a competent nerve specialist, is begun in the earlier stages. The chief cause of locomotor ataxia is syphilis.

LOCO, *lo'ko*, **WEED**, a peculiar and troublesome weed of the pea family which is well distributed over the American continent west of the Mississippi River. There are purple and white varieties; both are poisonous, but the purple is the more dangerous. When eaten by domestic animals, loco weed affects them seriously, almost at once. A horse which has been "locoed" cannot maintain an even gait, its sight is so altered that it may imagine a small stick to be a large obstruction, and it will lift its feet as high as possible in stepping over it. A person approaching may not be seen by such a horse until the two are but a few feet apart, and the

animal may be frightened by the sudden appearance. The effects upon cattle are quite similar. A sheep becomes very weak and frequently stumbles and falls.

Unless remedies are administered, victims of the malady induced by the weed will die. In the last stages an animal is unable to eat; exhaustion precedes starvation. Loco-weed is also known as "crazy-weed."

LO'CUST, the name applied rather loosely to several insects related to the grasshoppers. In the United States, the cicada, har-



LOCUST

vest fly, is called a locust, while the real locust of that country is known as the red-legged grasshopper (see *CICADA*; *GRASSHOPPER*). The hind legs of the locusts are large and powerful, so that they have great power of leaping, but their antennae are shorter than those of true grasshoppers. They make their peculiar "notes" by drawing their hind legs across their wing covers. When flying they produce sounds by rubbing their front and hind wings together.

The Rocky Mountain locust breeds west of the Mississippi River and east of the Rocky Mountains, selecting places along river bottoms or in grassy places of the mountains in the northern part of the region mentioned. The female lays twenty-five or more eggs, cementing them carefully together and covering them with a case, or cocoon, which she buries in the sand. From the first, the young resemble their parent, and after frequent molting they reach their full size in about seven weeks.

On reaching maturity locusts gather in flocks and begin incredibly long migrations, with an apparent definiteness of purpose and regularity of movement that no other insect ever shows. Sometimes they appear in such vast numbers as almost to obscure the light of the sun; toward night or on cloudy days they settle down on the earth and devour everything green they can find. Sometimes within a few hours whole acres of flourishing vegetation have been destroyed. In 1874 the locusts overran the whole territory west

of the Mississippi, and it is estimated that \$50,000,000 would not cover the damage they did. The next year 750,000 people were made destitute or suffered severely in Kansas, Nebraska and Missouri. No subsequent visitations in the United States have been so destructive, but the Old World has suffered. So many locusts once infested the eastern Mediterranean region that on the island of Cyprus the people destroyed more than 1,200 tons of locust eggs. Migratory locusts have been destructive in Asia and Africa. One swarm that flew over the Red Sea was estimated to cover an area of 2,000 square miles. Arabs and other natives of the East frequently use the dried insects as food.

LOCUST, a group of trees belonging to the pea family, found in various parts of the world. Their flowers, which resemble pea blossoms, have a strong scent and are borne in drooping white clusters. The wood is hard and durable, and is used in making spokes, hubs, cog wheels, and furniture, and in ship-building. In America are found the *honey*, the *yellow* and the *clammy* locusts, the latter a small tree or shrub cultivated in gardens.

LODGE, *loj*, HENRY CABOT (1850-1924), an American statesman and historian, was born at Boston, educated at Harvard University and admitted to the bar in 1876. While attaining eminence in his profession, he also wrote many books upon historical and legal subjects, notably *A Short History of the English Colonies in America* and biographies of Daniel Webster, Alexander Hamilton and George Washington. He was elected a Representative in Congress in 1887, served three terms and was then elected United States Senator. He was reelected in 1899, 1905, 1911, 1917, and 1923.

LODZ, *loje*, POLAND, a town in the government of Piotrkow, seventy-five miles southwest of Warsaw and 100 miles east of the old German frontier. Next to Warsaw, before the World War it was the largest town in Russian Poland. It was practically destroyed during the war, but previously was one of the most important cotton-manufacturing cities of the world. Population, 1932, 605,470.

LOEB, *lœb*, JACQUES (1859-1924), an American biologist, born in Germany. He was educated at Berlin, Munich and Strassburg and became assistant professor of physiology at the University of Würtzburg

in 1886; two years later he was given a similar position in the University of Strassburg. In 1891 he came to America, to accept an appointment as associate professor of biology at Bryn Mawr College, and in the following year he was called to the University of Chicago. In 1902 he became professor of physiology in the University of California.



MECHANISM OF THE LOG

Professor Loeb specialized in comparative physiology, becoming famous for ingenious experiments upon the subject of reflex action in lower animals, for his researches in the composition of protoplasm and especially for showing the effect of salt solutions on muscles of the heart.

LOESS, *lo'es*, a sandy deposit consisting of a fine, porous silt, containing more or less carbonate of lime. The latter collects in round lumps which take a vertical position. Loess was first described from deposits in the Rhine Valley, but it is found in large quantities in all parts of the world. Where the deposits are cut by rivers, they often form bluffs like those along the Mississippi, in some of which the formation exceeds 250 feet in depth. When humus is present loess forms excellent soil, but on account of its sandy nature it requires more rainfall than loam (see **SOIL**).

LO'FOTEN, or **LO'FODEN**, **ISLANDS**, notable as one of the world's most important fishing grounds, belong to Norway and lie off its northwest coast. Most of them are rugged and precipitous, and several of them have mountains. They are for the most part unfertile, though there are some regions which are productive. The cod and herring fisheries are especially important and are the chief source of wealth. About 30,000 fishermen are engaged around the islands. In some places the navigation, even for schooners, is very difficult, because of the tidal currents and the narrow channels between the islands, and near the south end of the group is the whirlpool called Malström. The best season for fishing is from December to March. Population, about 40,000.

LOG, a mechanism for measuring the rate of a ship's speed. The common log of the old-time sailing vessel has been superseded by the patent or taffrail log. The various parts of this log are shown in the accompanying illustration. The log line is attached at one end to a screwlike drag, having blades or fins arranged about a central shank.

The other end of the line is attached to a recording mechanism which is fastened to the rail about the stern of the vessel (the taffrail). When the drag is thrown into the water the ship's motion causes the fins and line to rotate in unison, and this rotation in turn is communicated to the recorder, which shows the number of revolutions and the distance covered in a specified time. There is also an electrical transmitting system which records the readings of the dial on charts in other parts of the ship. The *log book* of a ship is an official record of the speed, course, weather conditions and other important events of each voyage.

LOGAN, JOHN ALEXANDER (1826-1886), an American soldier and statesman, born in Jackson County, Ill. He served in the Mexican War with credit and at its close entered college, graduating from Louisville University in 1852. He was elected to the state legislature several times, and in 1858 was sent to Congress, as a Democrat, being re-elected after his first term. He resigned to enter the army, was made a colonel of an Illinois regiment, fought at Belmont, Fort Henry, Fort Donelson, and became brigadier-general, later major-general of volunteers. Logan participated in the Vicksburg campaign and was with Sherman in his march toward Atlanta, taking a conspicuous part in the Battle of Kennesaw Mountain and being twice placed at the head of the Army of the Tennessee. In 1866 he was re-elected to Congress, where he served until 1871. He was one of the managers of Johnson's impeachment trial. Logan was elected to the Senate in 1871. There he won a reputation as a forceful and eloquent

orator. In 1884 he was a leading candidate for the Republican nomination for President, but being defeated, was made the candidate for Vice-President. Later he was again returned to the Senate and died in office. He was the author of the *Great Conspiracy* and *The Volunteer Soldier of America*.

LOGAN, UTAH, the county seat of Cache County, seventy miles north of Ogden, on the Logan River and on the Oregon Short Line Railroad. The city is in an agricultural and stock-raising district and has flour mills, knitting mills, condensed milk and sugar factories, and cement plants. The state agricultural college is located here. There is a Federal building and a Carnegie Library. The commission form of government was adopted in 1911. In religion the Latter Day Saints predominate; they have a fine temple here, and a tabernacle. Logan was settled in 1859 and was incorporated in 1866. Population, 1920, 9,439; in 1930, 9,979.

LOGANBERRY, a fruit having the flavor of the wild blackberry, named for its originator, Judge J. H. Logan of California. He produced it by crossing a species of wild California blackberry and the Old Red Antwerp raspberry. The loganberry grows on a plant of the dewberry type. It turns a dark red when ripe and sometimes grows to be an inch and a quarter long. Since the latter part of the nineteenth century the fruit has been cultivated widely in Europe and America. The berries are used for pastry and wine.

LOGANSPOUT, IND., county seat of Cass County, seventy-two miles north of Indianapolis, at the confluence of the Wabash and Eel rivers and on the Wabash railroad and eight divisions of the Pennsylvania Railroad system. The city has good water power. The industrial establishments are railroad shops, employing about 1,000 men, and manufactories of motors, lime, cement, radiators, corsets, silos, refrigerators, and kitchen cabinets. The Northern Indiana Hospital for the Insane has a farm of 300 acres. The city has a fine courthouse, a Carnegie Library and Holy Angels' Academy. Logansport was first incorporated in 1838. Population, 1920, 21,626; in 1930, 18,508, a decrease of 16 per cent.

LOGARITHM, *log'a rith'm*, a mathematical term derived from the Greek words for *proportion* and *number*. The logarithm of a number is the exponent of the power to

which a constant number, called the base, must be raised to obtain the given number. In the common system of logarithms the base used is 10. In writing 10^3 we are expressing the equivalent of $10 \times 10 \times 10$, or 10 raised to the third power. Ten raised to the third power = 1,000, and the logarithm of 1,000 is 3. This is usually expressed: $\log 1,000 = 3$. Also, $10^{2.9222}$ equals 836; therefore $\log 836 = 2.9222$. According to the same principle the following expressions are derived:

$\log .001 = -3$	$\log 10 = 1$
$\log .01 = -2$	$\log 100 = 2$
$\log .1 = -1$	$\log 1,000 = 3$
$\log 1 = 0$	$\log 10,000 = 4$

From this table it is evident that the logarithm of any number greater than 1 and less than 10 is fractional; the logarithm of any number greater than 10 and less than 100 is greater than 1 and less than 2; the logarithm of any number less than 1 is negative.

Logarithms are of inestimable value in trigonometry and other subjects requiring the solution of complicated problems. Since a logarithm follows the law of exponents, familiar to all students of algebra, we add the logarithms to obtain the logarithm of the product of the numbers represented by them. In division, one logarithm is subtracted from the other to obtain the logarithm of the quotient. To obtain the logarithm of the square root of a quantity we divide the logarithm of the given number by the number denoting the root to be extracted. In raising a number to the given power we multiply the logarithm of that number by the number denoting the power to which it is to be raised. Thus the complicated processes connected with the manipulation of long numbers are greatly shortened by the use of logarithmic tables.

LOGIC, *loj'ik*, a study pursued in college which may be called the science or art of pure reasoning. When a person is said to be logical it is because he argues a question reasonably on a basis of fact that he may arrive at true conclusions. Logic is a study of the processes of thought; it is pure reasoning, with a view to a conclusion believed to be genuine.

Reasoning is the mental process by which what is already known about a thing is used as a basis and from this other conclusions are reached. There are two processes of reasoning, *induction* and *deduction*, which are described in their places in these volumes.

Aristotle, the founder of logic, was the originator of deductive reasoning and of the formal statement of such reasoning (see SYLLOGISM). Inductive reasoning is of much later development, having been reduced to a system by Francis Bacon. Logic and psychology both have to do with mental processes, but differ in that logic is concerned with the truth or falseness of ideas, while psychology treats of the nature of ideas.

LOGWOOD, the common name of a tree which grows in moist and swampy places in Central America and on the eastern shores of Mexico, and which has now become naturalized in many of the West Indian islands. The wood, which is red, tinged with orange and black, is so heavy as to sink in water, and it takes a fine polish. Its chief use, however, is as a dye wood. The best dyes were formerly obtained from the trees around the Bay of Campeachy, but that supply has been almost exhausted, and the chief sources are at present Honduras, Jamaica and Santo Domingo. When the trees have grown to a height of from twenty to fifty feet, they are cut down, and the heartwood is trimmed out, cut up into short logs and then hewn and ground into little chips. From these the color is extracted by water; the dye is afterward purified and varied by chemicals to such an extent that red, purple, black, violet, lilac, blue and green may all be obtained. An extract of logwood is used as a medicine.

LOHENGRIN, *lo'en grin*, the hero of an old legend which forms the basis of Wagner's popular opera of the same name. Lohengrin is represented as the son of Parsifal and one of the guardians of the Holy Grail. Sent by King Arthur to help the Princess Elsa of Brabant, he arrives in a vehicle drawn by a swan, delivers the princess from captivity and marries her. He accompanies the emperor in a campaign against the Hungarians and fights against the Saracens. He then returns to his bride at Cologne, but being pressed by her to state his origin, he is prevailed upon to tell it, after which he must, by the terms of his vow, return home to the Grail. See **GRAIL**, **THE HOLY**.

LOIRE, *lwahr*, (ancient Liger), the longest river in France, which rises in the Cevennes, flows first in a northerly, then in a westerly, direction and empties into the Bay of Biscay. Its whole course is over 620 miles. of which about 490 miles are navigable. It

has been largely canalized; artificial waterways connect it with many cities and other river systems.

LOK, *lohk*, or **LOKI**, *lo'ke*, in Northern mythology, a wicked deity, the father of Hel, goddess of the dead. Although regarded as the personification of evil, he was described as of handsome appearance and well able to fascinate when he chose. His ingenuity far surpassed that of any of the other gods, and when he could, at times, be compelled to exercise it in behalf of the other gods, the results were most beneficial. Ordinarily, however, he was occupied with the most evil plotting, partly from a spirit of mischief and partly from pure wickedness. It was he who brought about the death of Balder (which see).

LOLLARDS, a name applied as a term of contempt to various sects or fraternities deemed heretical, which arose in Europe about the year 1300. It became well known in England about the end of the fourteenth century, when it was applied to the followers of Wycliffe and to those influenced by his teaching. Later the Lollards drew upon themselves the enmity of the civil powers, and numbers of them were put to death, especially during the reign of Henry V.

LOMBARDS (so called either from the long *barte*, or spear, which they carried, or from the long beards they wore), a Germanic, or Teutonic, people who at the beginning of the Christian Era were dwelling on the Lower Elbe. They make little appearance in history till the sixth century, when, under their king, Alboin, they entered Italy in 568, and conquered the northern portion, which hence received the name of Lombardy. Authari, a successor of Alboin, married Theodelinde, a Frankish princess, who began the process of converting the Lombards to the orthodox faith. The only king of note among successors was Rothari, who in 643 promulgated a system of laws, which, with subsequent additions, became among German jurists the basis of the study of law during the Middle Ages. From 713 to 744 the Lombards had a powerful king in the person of Liutprant who extended temporary sway over the whole of Italy. From that time the power of the Lombards gradually declined; finally, Charlemagne captured Pavia and put an end to the Lombard kingdom (773 or 774).

LOMBARDY, *lom'burd y*, the part of Upper Italy which took its name from the Lom-

bards, who invaded and conquered it in the sixth century. The Lombard kingdom was overthrown by Charlemagne. Lombardy was formerly the name of an Italian department embracing what now constitutes eight provinces of modern Italy. Population, 1931 census, 5,545,307. See LOMBARDS.

LOMOND, LOCH, the largest lake in Scotland. It is situated in the counties of Dumbarton and Stirling and is twenty-three miles in length and from one to five miles in width. The region around here is especially famous for its beautiful and picturesque scenery.



LONDON, *lun'don*, ENGLAND, the capital and metropolis of the great British Empire and the United Kingdom of Great Britain and Northern Ireland. "It is the Mother City," writes a world-travel authority, "not of England only, but of the entire English-speaking world; to the American it means more than any other foreign city."

The largest capital on the face of the globe, London is very different from all of the other great capitals. It lacks the aspect of gaiety characteristic of Paris, the precise orderliness of Berlin, the artistic beauty of Washington, or the quaintness of The Hague. It is one of those cities that began in antiquity and grew without any special plan, absorbing in its expansion many other towns. Yet, when one considers the business and industrial interests centered there, the influence of the city in world politics, the ships that sail into its port from lands the wide world over, and its historic and literary traditions, one is compelled to agree with the opinion that it is the most important place on earth. For a thousand intimate pictures of this mammoth city, pictures not to be found in geographies or books of travel, one should read the novels of Charles Dickens.

Location and Extent. London is located in the southeastern part of England, on both banks of the Thames River, which runs through the city irregularly from west to east. As it is situated at the head of tide-water, between forty and fifty miles from the mouth of the Thames, London has many of

the advantages of a city on the coast. There is more than one method of reckoning the area and population of the great capital. What is known as Greater London—consisting of the "city," the administrative county of London and numerous outlying villages—is a place of 8,203,942 inhabitants (census of 1931), and covers an area of nearly 700 square miles. It includes all the territory within a radius of about fourteen miles from Trafalgar Square. Greater London, therefore, is the largest municipality in the world.

The part officially called the "City of London," lying on the north bank of the river, covers slightly more than a square mile. It is a separate municipality, having a civic corporation of its own, at the head of which is the lord mayor of London. In this section are located the offices of the important industrial and commercial companies and the large financial institutions. The resident population, consisting of policemen, janitors, etc., was 20,000 in 1931. The "city" and the county of London occupy an area of 117 square miles, and in 1931 their total population was 4,397,003. London proper is exceeded in population by Greater New York City (which see).

Like the American metropolis, it is divided into separate boroughs, each governed by an elected council and an executive. London is divided into twenty-eight such boroughs, and the executives bear the title of mayor. All of Greater London is under the jurisdiction of the metropolitan police force. The metropolitan police is not a municipal organization, but is administered by the government. Its central offices are New Scotland Yard, a massive building near Westminster bridge. The postal authorities divide Greater London into districts, designated as E. C. (East Central), W. C. (West Central), etc.

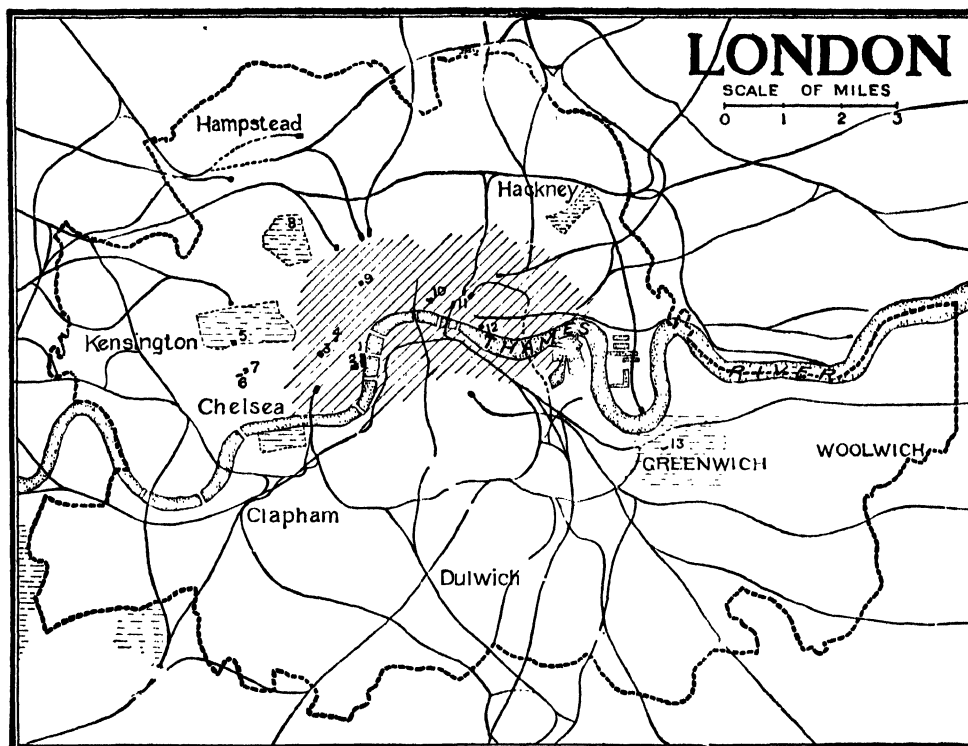
General Description. London is not a beautiful city, although it has many magnificent buildings and some fine streets. It is on low ground, and from no one place can a general view of the city be obtained. The business portions are densely crowded, the streets are narrow and crooked, and the fogs and smoke have rendered the buildings dingy and unattractive in appearance. The commercial and money-making parts of London are in the East End. Here are the port, the docks, the customhouse, the bank, the general post office and many public buildings, be-

sides the great Saint Paul's Cathedral. That part of London which lies west of the Cathedral contains the Houses of Parliament, Westminster Abbey, the royal palaces, the government offices, the British Museum, picture galleries and the residences of the aristocratic and wealthy classes.

London is practical and commercial, and the city has grown because of its business importance, a fact which accounts to a great

city has not been satisfactorily settled, for it is a tremendous task to move the millions of people whom business requires to travel about from day to day.

London has excellent communication with all parts of the United Kingdom and with the outside world through the Thames River and the numerous railways, several of which have handsome stations at their terminals. The river is spanned by a number of broad,



1. Houses of Parliament; 2. Westminster Abbey; 3. Buckingham Palace; 4. Saint James's Palace; 5. Albert Memorial; 6. Natural History Museum; 7. South Kensington Museum; 8. Zoological Gardens; 9. British Museum; 10. Saint Paul's Cathedral; 11. Bank of England; 12. Tower of London; 13. Greenwich Observatory.

extent for the crudity of its plan. Communication between different parts of the city is effected by cabs, tramway cars, omnibus lines, street railways and steamboats, which ply regularly along the Thames. Elaborate systems of underground railways connect different parts of the city and join the terminal stations of the great railways. In order to dispose of the soil taken from the underground tunnels, or tubes, without detriment to the streets, it was found necessary to build them at great depth and to work from the ends of the route into the city. Yet the problem of rapid transit within the

expensive bridges, some of which have been constructed on the site of other structures erected hundreds of years ago, and all of which are so arranged as not to interfere with navigation. The famous London Bridge is a granite structure erected in 1831 and enlarged in 1904. Over it passes an enormous traffic between the "city" and two densely populated boroughs.

Streets and Parks. Among the noted streets which run from east to west are Piccadilly and Pall Mall; the Strand and its continuation, Fleet Street, famed as the world's greatest newspaper center; Oxford

Street and its continuations, Holborn, Holborn Viaduct and Cheapside. Southward from Trafalgar Square extends Whitehall, on which are located many important government buildings, and to the right of this street is Downing, on which the Prime Minister has his offices. The Thames Embankment, otherwise known as the Victoria Embankment, which runs along the north shore of the river from the Houses of Parliament east, is a magnificent thoroughfare, adorned by important buildings and ornamented with parks and statuary. The river is held in control by a solid granite embankment, through which, at intervals, steps give access to the steamers. Hyde Park, containing about 400 acres, is surrounded by a carriage drive two and one-half miles long. This is the most fashionable of the royal parks and, together with Regent's Park, Saint James's Park and Green Park, is located in the West End. Regent's Park contains the gardens of the Zoological Society, with the largest collection of animals in the world, and the gardens of the Royal Botanic Society.

Other parks are located in different parts of the city, and more are being provided for as places of rest and recreation for the crowded inhabitants. On the southern side of the city is Greenwich Park, naturally one of the most beautiful, and famous as being the location of the Greenwich Observatory. More characteristic of London than its formal parks are the heaths, or commons, which are

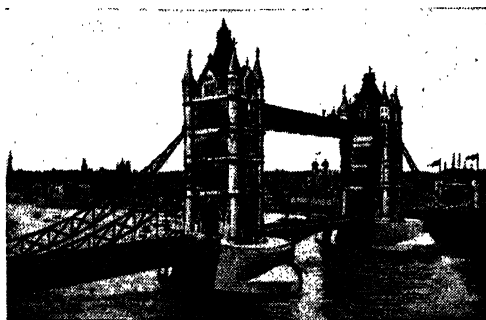
George IV; Marlborough House; Kensington Palace, the birthplace of Queen Victoria, and others are among the royal palaces which grace the city. The imposing Houses of Parliament stand on the north bank of the Thames, in the West End. The Tower of London is farther east on the same side of the river. The Bank of England; the Royal Exchange; the Mansion House, which is the official residence of the lord mayor; Guild Hall, the seat of municipal government, and the four Inns of Court are noteworthy buildings. The new Law Court is one of the most important of recent public structures. Saint Paul's Cathedral, completed in 1710 by Sir Christopher Wren, is a magnificent building, 510 feet in length, with a great dome 400 feet in height, the most conspicuous of London's buildings. Westminster Abbey adjoins the Houses of Parliament.

London is noted for its museums and galleries, chief among which is the famous British Museum. The South Kensington Museum occupies a capacious series of buildings which contain valuable collections in science and the fine arts, and the natural history department of the British Museum is located in an imposing building at South Kensington.

Notwithstanding its fogs and dirt, London is, taken as a whole, one of the healthiest cities in the world, and its public and charitable institutions are numerous. Hospitals and institutions for the care of the defective classes are well managed, and in recent years charitable work has been carried on extensively among the poorer classes.

On Fish Street Hill is a monument 202 feet high, erected in commemoration of the great fire of London; in Waterloo Place is the York Column, and in Trafalgar Square, the beautiful Nelson Column, at the base of which are the four famous bronze lions, the work of Sir Edwin Landseer. On the Thames Embankment is Cleopatra's Needle, a granite obelisk, companion to the one in Paris, that was brought to Europe from Egypt. Elsewhere in the city are many beautiful monuments and statues.

Commerce and Industry. The commerce of London is enormous. Besides that which is transacted over the railways from the ports Southampton and Liverpool, and the internal commerce with the other cities of Great Britain, there is an enormous tonnage from all parts of the world coming to the



TOWER BRIDGE

preserved nearly in their natural condition for the use of the people. Hampstead Heath, to the north, and Black Heath and Plumstead Common, on the southeast, are the largest.

Public Buildings, Monuments and Institutions. Saint James's Palace, erected by Henry VIII; Buckingham Palace, built by

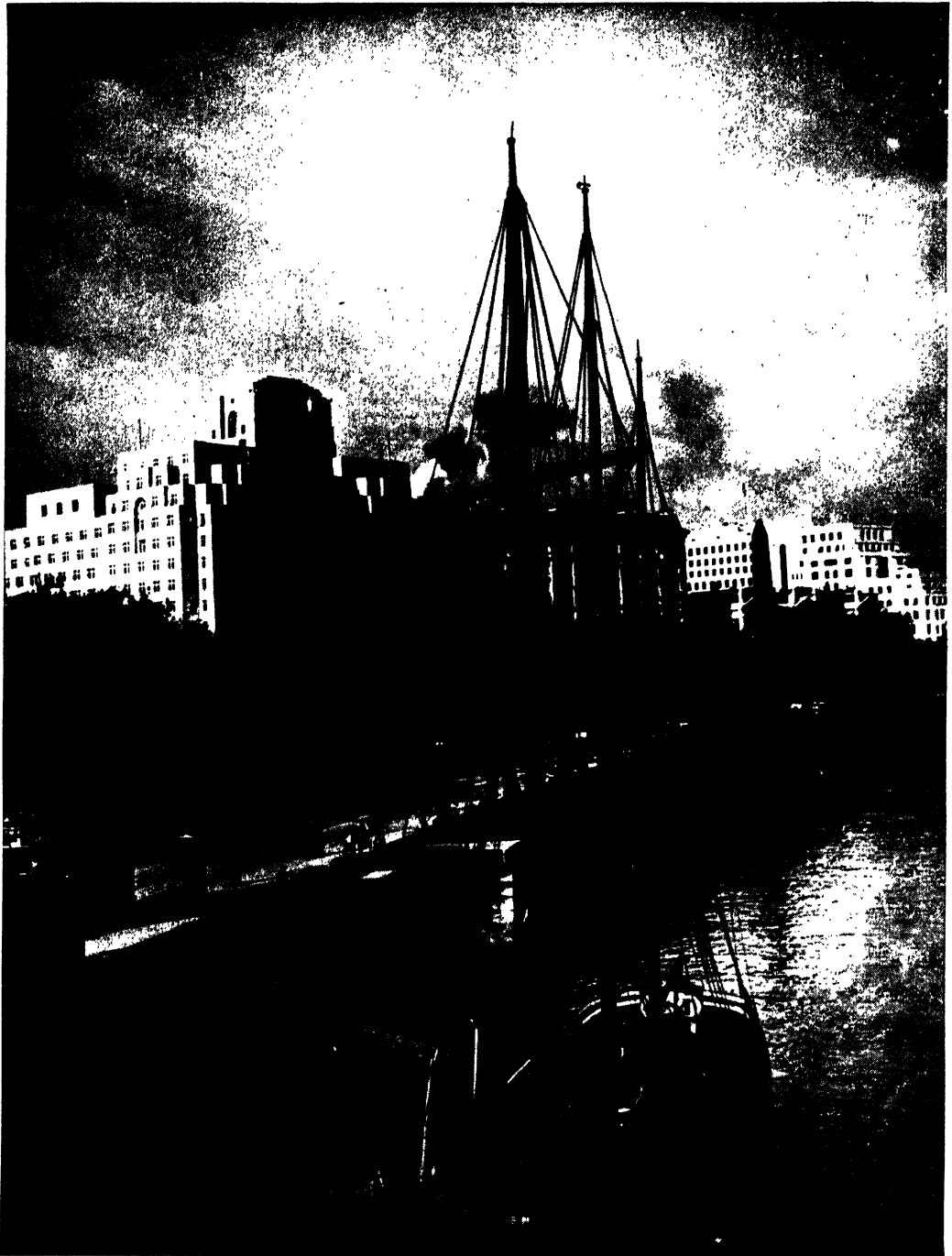


Underwood & Underwood

VIEWS IN LONDON

Above: Buckingham Palace, the London home of the British Royal Family.

Below: Pall Mall, an historic thoroughfare, with the National Gallery on the left, and St. Martin's Church in the center.



Acme

LONDON'S CHANGING SKYLINE

Modern structures front on the Embankment alongside the Thames River.

docks, which extend along the river from London bridge eastward. London is the great port for the produce of the East and West Indies. The value of the imports is estimated at more than one-third that for the entire United Kingdom. The manufactories of London are almost limitless in number and capacity. The largest breweries and sugar refineries in the Kingdom are located here; extensive chemical works, soap manufactories and dye works are also to be found; silk weaving is an important industry; metal manufactures of all kinds, as well as manufactures of clothing and articles necessary to the shipping trade, are correspondingly greater than in smaller cities. In fact, it is impossible to give any clear idea of the extent and character of the varied industries which have made London what it is.

The Port of London Authority controls the river and all traffic for a distance of sixty-nine miles.

History. There is no document describing the London of Roman times, but interesting facts of its early history are written in brick and stone. The London of to-day stands upon a buried city revealed by excavations, the recovered relics of which are preserved in museums. Among these relics are fragments of a wall probably built in A. D. 61, when the British under Queen Boadicea rebelled against their Roman conquerors. There are several references to London in the *Anglo-Saxon Chronicle*, giving sidelights on its history during the Scandinavian invasions, when it was repeatedly plundered. Alfred the Great fortified the city in the ninth century, and in a church on the site of Westminster Abbey, William the Conqueror was crowned in 1066. From him London received a charter. In 1087 the city was largely destroyed by the first of many fires that have laid it waste. The greatest occurred in 1666, a year after the Great Plague that caused 70,000 deaths. Improvements in sanitation, transportation and lighting, and the modernization of this famous city date from the beginning of the nineteenth century.

Related Articles. Consult the following titles for additional information:
 British Museum Thames
 Buckingham Palace Tower of London
 Greenwich Westminster Abbey

LONDON, JACK (1876-1916), an American novelist whose spirited and imaginative stories won him wide popularity. He was

born in San Francisco. Though he completed the freshman year in college, the education which fitted him for his literary career was his varied experience as a longshoreman, a sailor before the mast, a gold hunter in the Klondike, and as a care-free man tramping across the continent. He was a voluminous and powerful writer. Among his works which have been favorably received are *Before Adam*, *The Call of the Wild*, *The People of the Abyss*, *The Sea Wolf*, *The Valley of the Moon*, *The Turtle of Tasman* (a collection of short stories) and *The Human Drift*. His last books, *On the Makaloa Mat* and *Hearts of Three*, appeared after his death.

LONDON, ONT., the capital of Middlesex County, 121 miles southwest of Toronto, on the River Thames and the Canadian Pacific, the Wabash, the London & Port Stanley, the Canadian National, the Michigan Central and the Pere Marquette railroads. London is in the center of a fine agricultural region and is the shipping point for Western Ontario. It is an important manufacturing center. Population, 1931, 71,148.

LONDON COMPANY, a corporation chartered in London in 1606 for the purpose of English colonization in America. In the same year it was divided, one company being called the Plymouth, or North Virginia, Company, the other the London, or Virginia, Company. The latter was the first to plant a colony; it settled Jamestown in 1607.

'Related Articles. Consult the following titles for additional information:
 Mayflower Plymouth Colony Virginia

LONG BEACH, CALIF., a city in Los Angeles County, situated 20 miles south of Los Angeles. It is on the Union Pacific, the Atchison, Topeka & Santa Fé and the Southern Pacific railroads. It has a municipal airport, a naval reserve base and an army base; more than 20 traffic arteries pass through the city.

The town was established in 1881. By 1900 there were 2,252 inhabitants. Population has increased as much as 212 per cent in a 10-year period. Oil from 1,200 wells, gas, shipbuilding, soap, canning of fish and vegetables, automobiles, natural gas, oil well tools, fishing and shipping represent successful industries.

The city has 95 public and private schools, a junior college and five hospitals. The marine stadium accommodates 100,000 persons. Population, 1930, 142,032.

LONGEVITY, *lon jev'-i ty*, long duration of life. It is a purely relative term, since some forms of plants and animals live on indefinitely. Dayflies die after an hour or two of existence; the trunk of a tree has shown 1,335 rings, indicating as many years of life.

Current reports of excessive old age cannot be trusted, when they ascribe 169,152, or 140 years to aged persons. Census reports are also untrustworthy in respect to ages over 91. It is very improbable that any nation or race in ancient times produced habitually individuals with excessive longevity.

It is true that women of advanced age are more numerous than are men. Certain animals frequently exhibit instances of very long life: salmon, 100 years; carp, 150; pike, 150; parrot, 200-300; swan, 102; elephant, 150-200; tortoise, 200-300.

Causes of Long Life. Circumstances that favor long life in human beings are well known. They may be grouped as hereditary and environmental factors and as matters of personal habit.

Studies of heredity show that long-lived persons descend from a large number of long-lived ancestors. The inborn vitality of the body conquers threatening dangers that would shorten life.

In environment climate counts for much, since the colder zones are more healthful than the tropical regions. Savages do not attempt to prolong the life of the aged and indeed sometimes kill older persons who are a serious burden. On the other hand civilized peoples protect aged persons from premature death.

Larger families containing not more than 9 or 10 children have a good record for longevity in their members.

Personal habits very largely determine the length of life. The Jews have been credited with long life because of their rigid habits of hygiene; their care for their children is a very significant factor also. Physical and mental activity is a kind of insurance against early death. Distinguished men like Bellini, Voltaire, Goethe, Frederick Harrison and many of the American pioneers have prolonged their lives by pushing their labors up to the day of their death in a ripe old age.

Habits of eating have a direct bearing on the length of life. Over indulgence in youth may give way to caution in old age but the damage can not often be remedied. Scanty diet for aged persons is normal and healthful.



"The Belfry of Bruges"

LONGFELLOW, HENRY WADSWORTH (1807-1882), one of the best-loved and most widely read of American poets, was born February 27, 1807, at Portland, Maine. His mother, who claimed descent from John Alden, was a gentle and devout woman, and his father was a man of culture and breadth of view. Thus the refined home influences of his childhood and youth gave final impress to a character naturally amiable, sympathetic and unselfish. At the age of fourteen Longfellow entered Bowdoin College, where he so distinguished himself in the study of modern languages that later he was offered the professorship of that department. He completed his preparation for this position by a tour in Europe, and took up his new duties in 1829. In 1831 he married Miss Mary Potter, of Portland, a gifted and charming woman; and in 1834 he published his first important work, *Outre Mer*, a volume of prose sketches.

Longfellow was elected in 1835 to the chair of modern languages and literature in Harvard University, and after another year spent in Europe in the study of Scandinavian languages and literature he entered on a professorship which was to last, with interruptions, for seventeen years. Before his return to America, however, he lost his wife, who died at Rotterdam in 1835. For a period of six years he remained at Harvard, living in the old Craigie house, where the prose romance, *Hyperion*, was published (1839), and the *Voices of the Night* (1839), *Poems on Slavery* (1842) and the *Spanish Student*, a drama in three acts (1843), were written. Then, for a third time, he went abroad. Returning, he resumed his professorship and retained it until 1854. His remaining years were quiet, contemplative and uneventful, except for the one tragedy which broke their serenity—the death of his second wife, who was burned before his eyes in their Cambridge home.

In 1847 *Evangeline* was published; in 1855, *The Song of Hiawatha*; and in 1858, *The Courtship of Miles Standish*, all thoroughly American in theme and sentiment.

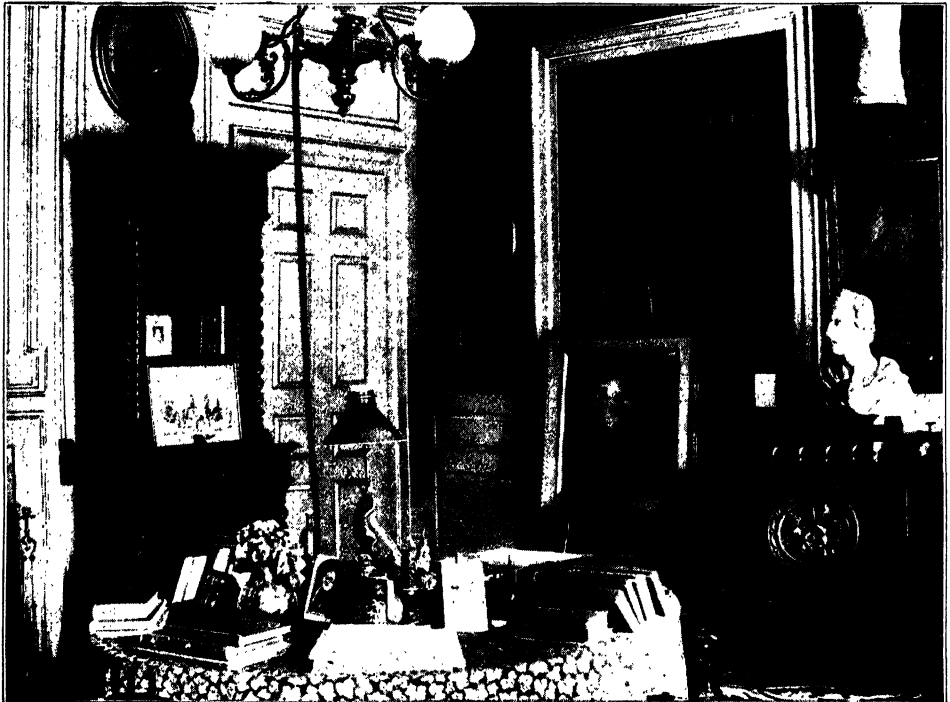


HENRY WADSWORTH LONGFELLOW
God sent his Singers upon earth
With songs of sadness and of mirth,
That they might touch the hearts of men,
And bring them back to heaven again.



LONGFELLOW'S HOME

For forty years the Craigie house was Longfellow's home. The front room on the right, once occupied by Washington, was the poet's study. Here are still kept the original manuscripts of his works. By the fireplace stands "the children's arm-chair."



LONGFELLOW'S STUDY

This is the study from which Longfellow could
 " * * * * see in the lamplight,
 "Descending the broad hall stair
 "Grave Alice, and laughing Allegra
 "And Edith with golden hair."

In 1863 *Tales of a Wayside Inn* appeared; in 1867, *Flower de Luce*, and in 1868 came *The New England Tragedy*, which, with *The Golden Legend* (1852) and *The Divine Tragedy* (1872), forms the trilogy, *Christus*. In company with his three daughters, Longfellow made a last trip to Europe in 1868-1869. While abroad he received the degrees of LL.D. and D.C.L. from the universities of Cambridge and Oxford, respectively, and when he died, in 1882, his bust was placed in the Poets' Corner in Westminster Abbey, an honor which had never been accorded to any other American. *Three Books of Song*, *Aftermath*, *The Hanging of the Crane*, *Moriturus Salutamus*, the *Masque of Pandora*, *Keramos* and *Ultima Thule* were the chief productions of Longfellow's later years.

Longfellow's power of graceful translation is seen in *The Poets and Poetry of Europe* (1845) and in the translation of Dante's *Divine Comedy* (1867), but his fame rests chiefly upon his three American epics. Though he possessed wide culture and his poetry is remarkably free from vulgarity, he is preëminently the poet of the common people. The truths he expresses may be commonplace, but they are realized by him with such fresh force and are so simply and sympathetically told that his power of appeal is pronounced among a large body of people for whom the more abstruse poets have no message. Refined in sentiment, musical in form, stimulating in effect, his verse is one of the most potent influences in American literature. His influence in his own day lay not only in his writings, but in the fact that he was one of the first American scholars to introduce into America the culture and learning of European countries. In all his work as a lecturer in college, he strove to present to his students the spirit and beauty of foreign literature, to widen their outlook.

Of the briefer biographies of Longfellow the most satisfactory are those by Thomas W. Higginson and F. H. Underwood. The biography by Samuel Longfellow is a more extended work of two volumes. In the article Reading the reader will find an outline on the life of Longfellow, a full-page graphic, and type lessons for the study of his poems.

Related Subjects. Consult the following titles for additional information:

Alden, John	Evangeline
Courtship of Miles Standish	Hiawatha

LONG ISLAND, an island belonging to the state of New York, of which it forms the

southeastern extremity. It is about 118 miles in length, its greatest width is twenty-three miles, and its area is 1,682 square miles. It is connected with New York City by four free suspension bridges across East River (See BRIDGE, subhead *Suspension Bridges*) and by links of the New York subway system. It is separated from Connecticut by Long Island Sound. The island has become a vast suburban territory, and is dotted with towns and estates of people whose business is in the great city. The chief city is the borough of Brooklyn, which is a part of Greater New York. See NEW YORK (city).

Battle of Long Island, a battle of the Revolutionary War, fought on Brooklyn Heights, August 27, 1776, between an American force of 8,000 under Israel Putnam, and a British force of 15,000 under General Howe. The Americans were attacked from four directions, and though they fought gallantly for more than four hours, they were compelled to flee, many surrendering. The British loss was about 400; the American loss, about 1,400 in killed, wounded and captured. The battle decided Washington to evacuate his position on Long Island, and was the beginning of his masterly retreat which took him into the region of the Delaware River.

LONGITUDE, *lon'ji tude*, in geography, the distance of a place due east or west from a given meridian, this distance being measured along the equator or a parallel of latitude. Longitudes are generally reckoned from the meridian of Greenwich, England, although Washington has been used to a limited extent. Since the parallels of latitude get smaller toward the poles, at which all the meridians converge, it is evident that degrees of longitude which are $69\frac{1}{2}$ statute miles long at the equator get shorter toward the poles, at which they finally become 0.

As the earth makes one revolution on its axis, that is, turns through 360° of longitude from east to west, in twenty-four hours, if the sun or a star is on the meridian of any place at a particular time it will be on the meridian of another place 15° west of the first in one hour. Thus, 15° of longitude represent one hour of difference in time, and hence longitude may be easily determined by the use of the chronometer set to Greenwich time, which is the method commonly employed at sea. Longitude is reckoned to 180° eastward or westward of the fixed meridian. See LATITUDE; LONGITUDE AND TIME.

LONGITUDE AND TIME. The teacher in school tells us that the circle or circumference of the earth is divided into 360 equal parts, each part of which is called a degree. This measurement came down to us from more than 2,000 years before Christ, for it was used by the Babylonians and adopted, with slight improvements, by the ancient Greeks. The reason that 360 divisions in the great circle were made is that the ancients believed that the year contained 360 days. A degree, then, is one of the 360 equal parts of the circle of the earth.

We know that from the instant in any day that the sun is directly over our heads until it is again in the same position, 24 hours have passed. During that 24 hours each portion of the earth's surface, at one moment or another, has been directly under the sun. Therefore, in the 24 hours, the entire circumference of 360° has passed directly beneath the sun. Now we see clearly why our arithmetics tell us 24 hours of time will be the same measurement as 360° of space, for it takes 24 hours for the entire 360° of the earth's circumference to pass beneath the sun. If, then, 24 hours of time equal 360° of space, 1 hour of time will equal $\frac{1}{24}$ of 360° of space, or 15° of space. Now let us put in tabular form those two facts before we go farther:

24 hrs. of time = 360° of space,
1 hr. of time = 15° of space;

and let us apply this truth at once in a practical way. If it is noon exactly where you stand and there is a difference of 1 hour in every 15° , how far east or west of you will the time be 2 hours different from what it is where you are? Will it be earlier or later than noon at points east of you? The earth in its orbit moves from west to east, so it is clear that when it is noon with you it has already been noon at places east, for they have been directly beneath the sun and the sun has appeared to move on westward toward sundown. If you are at a point called A and it is noon, and a point called B is 15° E. of you, then at that point it is 1 o'clock in the afternoon. By the same process of reasoning, when it is noon at your location at A, it is not yet noon at a point 15° W. of you, for that point has not yet, in its whirling through space, come directly under the sun. It will not do so for 1 hour, for it has yet to turn $\frac{1}{24}$ of the distance around on the axis before coming directly beneath

the sun. These are elementary truths, but they must be understood before one has a basis of fact on which to build his knowledge of longitude and time.

It is clear that we must have smaller divisions than degrees if we would measure with accuracy. The ancients divided a degree into 60 equal parts, called minutes, because they divided their hour into 60 equal parts, called minutes. Now, we must not confuse a minute of time and a minute of space, for they are as distinct as hours and degrees. The minute of space is still further subdivided into 60 equal parts, called seconds of space, for the reason that the minute of time is also divided into 60 equal parts, called seconds. Therefore, we may complete the partial table above, as follows:

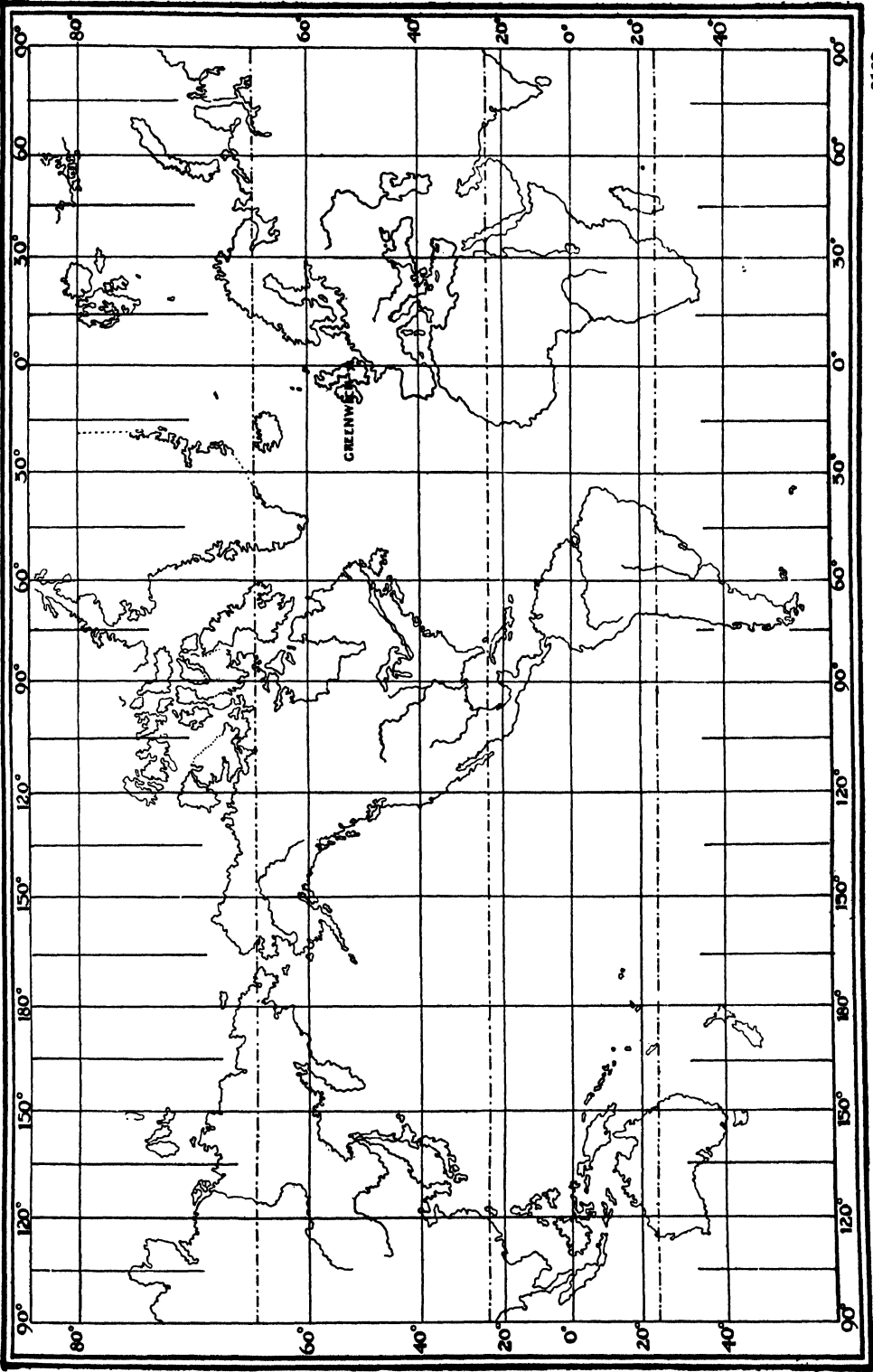
24 hrs. of time = 360° of space,
1 hr. of time = 15° of space,
4 min. of time = 1° of space,
1 min. of time = $15'$ of space,
1 sec. of time = $15''$ of space.

Exercises. Let some object conveniently placed represent the sun; place a globe in such a position toward the sun that it must be noon at the place where you live; point out all the other places on the globe where it must be noon at the same time. *Meridian* is a term which means noonday; therefore, the name *meridian* has been given to this imaginary line which passes through your town and through all other towns where it is noon at the same time. A more complete definition of meridian is great circle—the meridian which passes through your home extends around the world. Locate on the globe the opposite meridian. When it is noon on your meridian, what time must it be at the place exactly opposite? How many hours difference in time between these two places? How many degrees difference between these two places?

Point out the place east of your meridian which is half-way toward the opposite side of the globe from you. It would be sunset. How many hours difference in time and how many degrees distant is that spot from your home? Point to another meridian where it is also 6 o'clock, considering it yet to be noon at your place. Will it be sunrise?

From what you can learn from the above exercises answer this question:

If clocks keeping correct time were placed at points exactly 15° apart clear around the earth, beginning at your home, what would



LONGITUDE AND TIME MAP OF WORLD, WITH DIVISIONS OF 15° AND 30°

be the exact difference in time these clocks would show?

Plan for Teaching. Longitude and time should not be taught without the use of the

Do not leave the fundamental principles until each member of the class thoroughly understands them; the boy or girl who does not know the relative values of 1 hour and 15° will never learn longitude and time; drill over and over on the fact that 24 hours

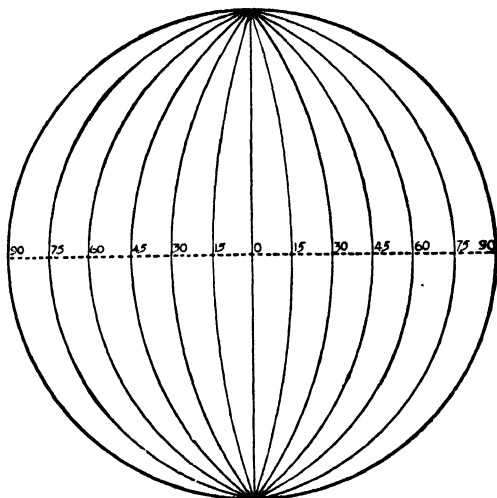


FIGURE 1. HEMISPHERE

globe and a flat map of the world; it would be well, also, to present a diagram of a hemisphere; better than the ordinary representation of a hemisphere as shown in Fig. 1 would be a diagram, such as Fig. 2, showing the north or south pole so that the entire 360° of the circle can be shown.

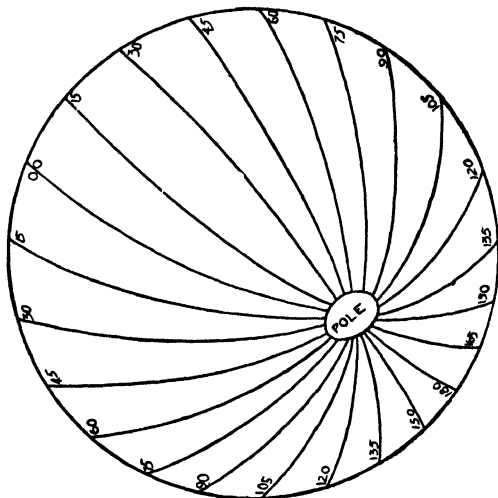
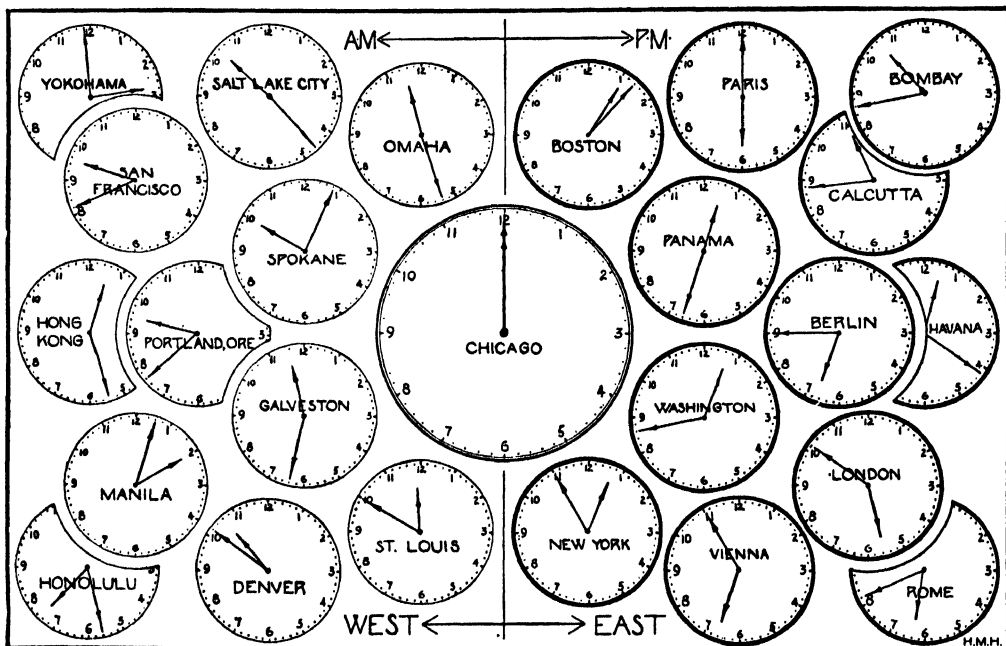


FIGURE 2. SHOWING CONVERGING MERIDIANS

of time represent the passing under the sun of 360° of space in the revolution of the earth. That once understood, it is easy to show that 15 of these degrees pass under the



COMPARATIVE SUN TIME, WHEN NOON IN CHICAGO

sun in 1 hour of time, and from that, the other subdivisions are explained without difficulty.

Have a pupil stand facing north with hands outstretched toward the east and west. If it is noon directly over his head, ask him if it is earlier or later than noon in a certain city some hundreds of miles east or west. Then follow with easy problems relating to places whose location the class fairly well understands. Ask them to tell you how many hours apart in time the city A and the city B are, if one is 30° E. of you and one 15° W. You can continue such problems until you have practically made the circuit of the globe. (See map, page 2163.)

The Given Meridian. Thus far we have not developed the fact that all men must agree upon a certain meridian from which to reckon longitude east and west on all the earth's surface. In our investigations above we have based all questions and computations upon the meridian running north and south through our home. The children will understand clearly why it is impossible that all men should be able to use in their computations our own meridian, so we all agree upon a certain meridian which runs north and south through England, France, Spain

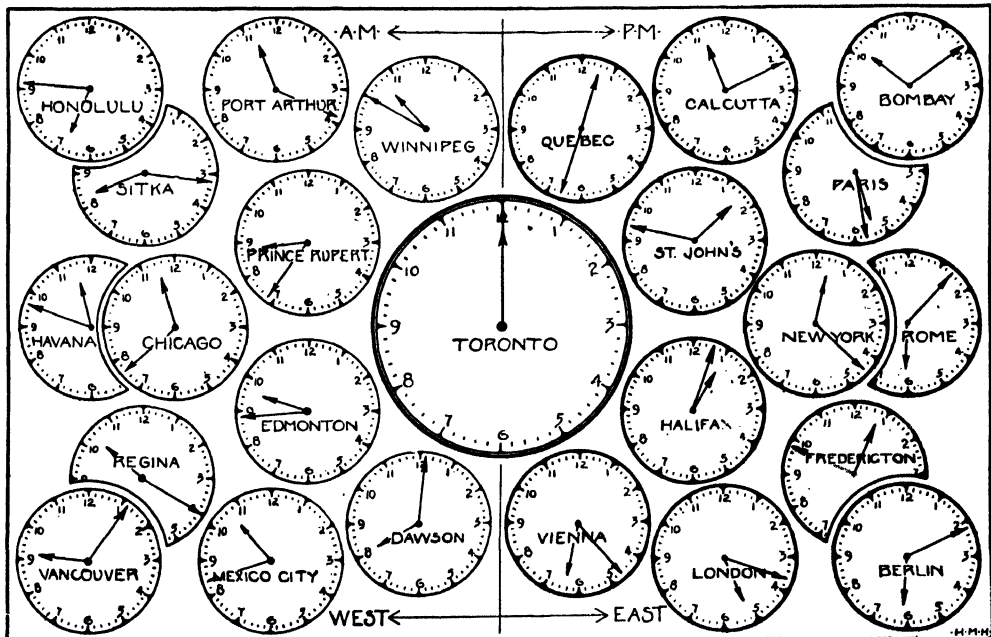
and Western Africa, exactly at the point where it passes through Greenwich, England, where is located a great astronomical laboratory. This point is only a few miles from the largest city in the world. We call the meridian of Greenwich 0° and reckon all distances in longitude east and west from that given meridian.

Exercises. Have the pupils solve the following problems, mentally, without consulting the chart.

1. Chicago is about 90° W. of Greenwich. Chicago clocks show how many hours later or earlier than Greenwich time?
2. When it is 2 o'clock in the afternoon at Greenwich, what time is it in Chicago?
3. Petrograd is 30° E. of Greenwich; Hamburg, in Germany, is 10° E. of Greenwich. How many hours difference in time between the two places?
4. If it is noon in Petrograd what time is it in Hamburg?
5. Denver is about 105° W.; Carson City, Nevada, is about 120° W. When it is 11 o'clock in the morning at Denver, what is the time in Carson City?

The diagrams will help you to understand the differences in time between cities. The clocks in the center show noon in Chicago and Toronto.

Rule for Longitude and Time. If the pupils have had no difficulty in understand-



COMPARATIVE SUN TIME, WHEN NOON IN TORONTO

ing the principles thus far developed and have been able to solve the simple problems above suggested, they will understand the reasons underlying the following rules for solution of the more difficult problems in longitude and time:

1. *When the difference in longitude is given, divide this difference in longitude, expressed in degrees, minutes and seconds, by 15. The difference will be the difference in time expressed in hours, minutes and seconds.*

Below is an example to illustrate the rule:
The longitude of Baltimore is $76^{\circ} 37' W.$; that of San Francisco is $122^{\circ} 23' W.$ What is the difference in time?

$$\begin{array}{r} 122^{\circ} 23' \\ 76^{\circ} 37' \\ \hline 15) 45^{\circ} 46' \\ \hline \end{array}$$

3 hrs. 3 min. 4 sec.

2. *When the difference in time is given, expressed in hours, minutes and seconds, multiply the difference by 15. The result will be the difference in longitude in degrees, minutes and seconds.*

Below is an example to illustrate the rule:
When it is noon at San Francisco it is $13\frac{1}{2}$ minutes past 3 o'clock in the afternoon at New York. If the longitude of New York is $74^{\circ} 3' W.$, what is the longitude of San Francisco?

$$\begin{array}{r} 3 \text{ hrs. } 13\frac{1}{2} \text{ min.} \\ 15 \\ \hline 48^{\circ} 20' \\ 74^{\circ} 3' \\ \hline 122^{\circ} 23' \end{array}$$

Note. If one point is east of the meridian at Greenwich and one point is west, the difference in time or in degrees is found by adding rather than subtracting. Demonstrate the truth of this.

Below are a few problems for practice. Each should be understood by every pupil who attempts to solve it, and any difficult points should be fully explained before the next problem is attempted:

1. A vessel sailed from a port directly on a line of latitude for a certain distance, then turned and went due north to port. Here the captain found his watch to be 40 min. slow. In what direction did he sail at first, and how many degrees?

2. A man travels until his watch is 1 hr. 20 min. fast. Does he go east or west, and how many degrees?

3. A boat race is finished on the Thames River at 4 o'clock P. M. How early can the fact be published in Boston papers? Boston is $71^{\circ} W.$

4. What time is it in Buffalo, $79^{\circ} W.$, when it is 20 min. after 6 o'clock A. M. July 6, in Constantinople, which is $29^{\circ} E.$?

5. The following cities have the longitude given:

Berlin	$13^{\circ} 24' E.$	Detroit	$83^{\circ} 43' W.$
Boston	$71^{\circ} 3' W.$	London	$6' W.$
Calcutta	$88^{\circ} 20' E.$	Paris	$2^{\circ} 20' E.$

(a) When it is 3 o'clock P. M. in Berlin, what time is it in Detroit?

(b) Noon at Calcutta is what time in London?

(c) 8 P. M. in Paris is what time in Boston?

See INTERNATIONAL DATE LINE.

LONG PARLIAMENT, the name given to a Parliament of Charles I which assembled in 1640 and was not formally dissolved until March, 1660. Summoned to supply Charles with the means of subduing the insurgents in Scotland, it refused to proceed to this business until it had secured the redress of certain grievances. After its grievances had been attended to, Parliament turned its attention to religious questions, and here disagreement speedily arose. It was this Parliament which conducted the civil war against Charles I, and before the close of that struggle the Independents in the army had become strong enough to demand the withdrawal from Parliament of the Presbyterian members, who considerably exceeded in number the Independents. The name *Rump Parliament* is given to the body which remained. The Rump Parliament put Charles to death and established the Commonwealth, but Cromwell dissolved the body. After Cromwell's death it was called together again, but its only act of importance was to order a new election and vote its own dissolution.

Related Articles. Consult the following titles for additional information:

Charles I (England)	Cromwell, Oliver
Commonwealth of England	Strafford, Thomas

LONGSTREET, JAMES (1821-1904), a distinguished Confederate general, born in South Carolina. He was graduated at West Point in 1842, saw service on the Mexican frontier and was brevetted captain and major for gallantry. When the Civil War broke out Longstreet joined the Confederate forces. He fought in the Seven Days' Battle, in the second



LONGSTREET

Battle of Bull Run, at which his arrival at the right time turned defeat into a Confederate victory, at Fredericksburg, at Gettysburg, at Chickamauga and in the Battles of the Wilderness. After the war he held important government positions, among them those of minister to Turkey and United States commissioner of railroads, which post he held at the time of his death.

LOOKOUT MOUNTAIN, a precipitous height of land rising 2,126 feet above the sea, in the Lookout Mountain range in Southeastern Tennessee. The mountain is less than four miles distant from Chattanooga, which lies to the northeast. It is a part of the Chickamauga and Chattanooga National Military Park, an area in which were fought the Civil War battles of Chickamauga, Missionary Ridge, and Lookout Mountain, the latter frequently referred to as the "battle above the clouds." The Park extends southward from Tennessee into Georgia. From the top of Lookout Mountain the visitor has a magnificent view into four states.

LOOM. See **WEAVING**.

LOON. See **DIVER**.

LOQUAT, *lo'kwaht*, originally a Chinese and Japanese fruit, now cultivated also in the subtropical countries of Europe and in California and Florida. The tree is an evergreen, and attains a height of twenty to thirty feet, but when cultivated it is not allowed to exceed twelve feet. The fruit is pear-shaped, yellow and about an inch in diameter, and has an acid flavor agreeable to the taste. A number of improved varieties have been developed.

LORAIN, OHIO, in Lorain County, twenty-five miles west of Cleveland, on Lake Erie, at the mouth of the Black River, and on the Baltimore & Ohio and Nickel Plate railroads, which connect closely with the New York Central, Pennsylvania, Erie, and Wheeling & Lake Erie. There is autobus service, and an airport is just east of the city. The harbor offers unexcelled marine facilities, and several lines of boats carry raw material for its factories and its manufactured goods. Iron ore is brought from the Lake Superior region. The industrial establishments include steel mills, foundries, shovel works, brickyards and shipbuilding plants. There are a Carnegie Library, Saint Joseph's Hospital and more than a score of churches. It was settled in 1822. Population, 1930, 44,512.

LORD, a noble title in Great Britain, held by one of exalted birth, or bestowed by royal favor. The title by courtesy is given to eldest sons of earls, dukes and marquises. A lord is addressed, "My lord;" "your lordship."

LORD CHIEF JUSTICE, the title of the chief judicial officer in England. There are three English courts of practically equal power, but the title, by consent since early in Victoria's reign, has been given to the chief justice presiding over the King's Bench Division of the Supreme Court of Judicature. The Lord Chief Justice is a lord of Parliament, by virtue of his office, and is addressed, "My lord." See **GREAT BRITAIN**, subhead *Government*.

LORDS, HOUSE OF. See **GREAT BRITAIN**, subhead *Government*.

LORELEI, *lo're li*, a rock on the right bank of the Rhine River, about 430 feet high. Its extraordinary echo gave rise to the legend that the rock was the home of a siren who, by her wonderful singing, lured all who passed by on the river to destruction. This legend is the subject of a beautiful poem by Heine, which has been several times translated into English.

LORTIMER, GEORGE HORACE (1868-), an American editor and story writer. He was born in Louisville, Ky., the son of a Baptist clergyman, and was educated at Colby and at Yale. He entered upon a business career in the Chicago stockyards, but abandoned it for a literary career. In 1899 he became editor of *The Saturday Evening Post*, which position, he held until 1934, when he became chairman of the board. He published *Letters from a Self-made Merchant to His Son* and *Old Gorgon Graham*. Both of these volumes contain truths and aphorisms of the business world, expressed so interestingly and pithily that the books enjoyed an extensive popularity immediately upon their publication.

LO'RIIS, a lemur found in the East Indies. It has a round head, long limbs, short muzzle, large eyes and no tail. One species is called the *slender loris*. They sleep during the day rolled up in a ball and cling with all four feet to a branch. They are slow and stealthy and live upon birds, insects and vegetables. The *slow loris* is larger than the *slender loris* and is held in reverence by the Malays because of its odd appearance and retiring habits.

LORNE, JOHN, Sir. See ARGYLL, JOHN DOUGLAS SUTHERLAND CAMPBELL, Ninth Duke of.

LORRAIN' CLAUDE. See GELÉE, CLAUDE.

LORRAINE. See ALSACE-LORRAINE.

LORY, a group of climbing birds belonging to the parrot family, with broad tails and dense, soft, brilliantly colored plumage. They live chiefly upon honey, which they are able to extract from flowers by means of their brush-tipped tongues. An Australian species has a bright green head and a blue body, marked on the under parts with red. The collared lory is easily taught to speak.



LOS ANGELES, *loce ahng' hail ais or loss an' je less*, CALIF., the largest city on the Pacific Coast and the fifth in population in the United States, is situated in a beautiful parklike region which attracts winter tourists by the thousands. It is the county seat of Los Angeles County, one of the most charming regions of Southern California, and is surrounded by numerous attractive suburbs. Among these are Hollywood, Glendale, Burbank,

Beverly Hills, Santa Monica, Long Beach, Pasadena, Alhambra, Universal City, and Culver City—communities devoted almost entirely to the moving picture industry. The mild climate and prevalent sunshine during practically the entire year make the Los Angeles district a haven for motion picture producers.

Location and Area. The city is situated on the Los Angeles River, ten miles south of the Sierra Madre Mountains, fifteen miles east of the Pacific Ocean, and 484 miles southeast of San Francisco which it supplanted in 1920 as the first city of the state in size. This was accomplished by developing the ports of San Pedro and Wilmington and by cooperating with other adjoining communities. A strip of land a half mile wide connects Los Angeles and its ports; the corporate limits of the city now enclose an area of 450 square miles, as compared with 100 square miles in 1910.

Communications. With a water frontage of perhaps a score of miles Los Angeles has

become one of the leading Pacific Coast ports. It is a port of call for more than 150 steamship lines reaching practically every part of the world. For the improvement of the harbor the United States government has appropriated more than \$12,000,000; the city government has expended an additional \$30,000,000 in building wharves, channels and other modern harbor facilities. More tons of merchandise are shipped out of Los Angeles than out of almost any other port in America.

The city is served by the Atchison, Topeka & Santa Fé, the Southern Pacific and the Union Pacific railroads; it is the center of a complete interurban system. All of the surrounding suburbs, including Santa Monica, Redondo, Inglewood, Torrance, Long Beach, Huntington Park, Glendale, San Fernando and Catalina Island, are easily accessible. Los Angeles can be reached by numerous motor bus routes from the east and from the north. Air transport is given ample accommodation in several modern airports.

General Description. Los Angeles is well laid out and is noted for its broad streets and handsome boulevards. In the residential sections the streets are embowered in palmetto palm, eucalyptus and other trees and various forms of tropical shrubs and flowers. The city has an elaborate system of parks, with a total area of more than 4,000 acres. Pershing Square, formerly Central Park, in the business section, is noted for its beautiful trees and flowers and for the soldiers' monument. Elysian Park is of interest because of Fremont's Gate, erected in honor of the great explorer, and its botanical gardens, which contain a great variety of trees, shrubs and flowers, gathered from nearly all parts of the world. Griffith, the largest municipal park in the United States, is in the foothills above Hollywood. Its planetarium is the third to be built in this country. Other notable parked areas include Lincoln, Westlake, Echo, and Hollenbeck. In Exposition Park there are the museum of art, science and history, the state exposition building, the Seventh Regiment Armory and the Los Angeles Memorial Coliseum. The parks are connected by wide boulevards which lead to the various resorts in Los Angeles and which connect with the state road system.

Buildings and Institutions. Among the public buildings of note are the magnificent city hall, the chamber of commerce, the fine arts building, the County Hall of Justice, the

public library, the Temple and Shrine auditoriums, Trinity Auditorium and the Bible Institute. Among the most noted churches are the Roman Catholic Cathedral; Saint Paul's Cathedral, Episcopalian; the First Congregational Church; the First Methodist Episcopal; The Immanuel Presbyterian; the Wilshire Boulevard Temple; and the Old Plaza Church, of interest as dating from the Mission days and as situated close by the headquarters of General Fremont. There are many handsome hotels and private homes in the residential districts. Because of the general use of oil for fuel and of hydroelectric power Los Angeles buildings do not have the grimy appearance caused by the smoke nuisance.

The city has many educational institutions including the University of Southern California (Methodist Episcopal), Occidental College (Presbyterian) Loyola University (Roman Catholic), the University of California at Los Angeles and California Christian College (Disciples). The public libraries of the city contain over 1,000,000 volumes.

Industry and Trade. Los Angeles County leads all counties in the United States in agricultural production. In addition to commercial crops of temperate America, due to her climatic situation she is a large producer of subtropical and off-season crops including oranges, lemons, avocados, walnuts, apricots and winter vegetables; she is also the agricultural market center for Southern California. California's products reach the consumer through three avenues: cooperative marketing, independent shipments and produce wholesale markets. The monthly agricultural income passing through the Los Angeles district averages about \$30,000,000.

Near the city are oil wells which at one time furnished about one-fourth of all the oil produced in the United States. Manufacturing industries have developed very rapidly. They include refining of petroleum, manufacture of asphalt, lubricating oils, gasoline, motion picture making, meat packing, production of women's wearing apparel, rubber tires, air craft, furniture, mining machinery, fish canning, manufacture of steel, iron and lumber products. The area to the east has large mineral deposits, especially non-metallics such as cement and lime, gypsum, borax, clay, gold, silver, potash, talc and diatomaceous earth.

History. Los Angeles was settled in 1781

by Spaniards from Mexico and was named *Pueblo de Nuestra Senora la Reina de Los Angeles*, which means, "The City of our Lady, the Queen of the Angels." The colony numbered 44 persons. By 1810 the population was 365. It grew slowly for a number of years, although for a long period it was the capital of Mexico's province of Alta California. It surrendered to the United States troops in 1846; not long after that event it was chartered as a city. Oranges were first grown commercially on the Wolfskill ranch in 1850. The first newspaper was published in 1851. With the entrance of the railway lines into Southern California the city increased rapidly in population; the discovery of new, large fields of petroleum in its vicinity gave additional impetus to its already thriving industries.

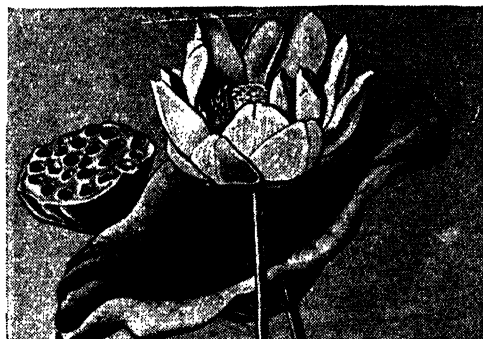
In 1913 the great aqueduct through which water is brought to the city was completed. This structure diverts the flow of the Owens River through an intake eleven miles north of Independence near the base of Mount Whitney (see **AQUEDUCT**). It is 235 miles long and has a rated capacity of 259,000,000 gallons a day. Los Angeles uses the system also to generate electric power. The phenomenal development of the city began about 1918. Population increased 1,000 per cent in a period of twenty-five years. The city is governed by a mayor and council. Population in 1930, 1,238,048, a gain of 114.7 per cent in 10 years.

LOTTERY, a scheme for the distribution of prizes by chance, the plan being generally to have a certain number of prizes and a much greater number of numbered tickets. The prizes are allotted to the holders of tickets which bear the same numbers as others drawn by chance from a receptacle. By act of the United States Congress lotteries are deprived of the use of the mails, and also of the privilege of the express companies.

LOTUS, a name given to a number of different plants. Of these the best known grows in Egypt. It is a beautiful water lily, with large, white and fragrant flowers and immense, wide-spreading leaves. This lily was held sacred to Osiris in ancient times and was a symbol of the creation of the world.

In the United States the yellow water lily or water chinquapin, is generally called the lotus, but the plant which is known by

botanists as the lotus is a little creeping herb, which is chiefly grown in temperate regions throughout the world. Four or five



AMERICAN LOTUS

species are found in Great Britain, where they are known as bird's-foot trefoil and cat-in-the-clover and by other fanciful names. The chinquapin is described more fully in the article NELUMBO.

LOTUS EATERS, in Greek mythology a race of people who fed upon the fruit and flowers of a plant called the lotus tree. This food caused all who partook of it to forget all about their native country. The Lotus Eaters, or Lotophagi, lived on the northern coast of Africa. In the *Odyssey* there is an account of a visit made by Ulysses to that land on his return from the siege of Troy. Three of his companions ate of the magical food, but their leader forced them to return to the ship and forbade the others to taste it, thus preventing the company from being seduced by its awful power. The lotus tree has been identified with the *jujube* (which see).

LOUBET, *loo'bay*, EMILE (1838-1929), a French statesman and president of the Republic. He began his career as a lawyer and rose rapidly. He was elected to the Chamber of Deputies in 1876 and to the Senate in 1885. In 1887 he became minister of public works, five years later he became premier and on the death of President Faure, in 1899, he was elected president of France. The country prospered under his administration. On the expiration of his term in 1906, he was succeeded by Fallieres.

LOUIS I, *loo'is*, called the *Debonair* or the *Pious* (778-840), the son of Charlemagne, succeeded his father in 814 as king of the Franks and emperor of the West. In 817 he divided his dominions among his three

sons, Lothair, Pippin and Louis. In 829, in consequence of the urgent solicitations of his second wife, Judith of Bavaria, who had borne him a son, he made a new division of the Empire. The result was that the elder brothers revolted and commenced a war, which, with varying fortune to the parties concerned, lasted till the death of the father. He was succeeded as emperor by his son Lothair I; and by the Treaty of Verdun in 843 his son Charles the Bald obtained the territories from which France as a separate nationality developed; another son, Louis the German, obtained territories from which the distinctive German nationality developed.

LOUIS IX, known as SAINT LOUIS (1215-1270), one of the medieval Crusaders. He was king of France, eldest son of Louis VIII, and succeeded to the throne in 1226. In the year 1244, when dangerously sick, he made a vow to undertake a crusade to Palestine; and in 1248 he sailed with his wife, his brothers and a large army to Cyprus, whence in the following year he proceeded to Egypt. He was taken prisoner by the Mohammedans and released only on the payment of a large ransom, and it was not until the year 1252 that he returned to France. For the next fifteen years he employed himself in improving the condition of the people by wise laws. In 1270 he determined to undertake another crusade. He sailed to Africa, besieged Tunis and took its citadel, but a contagious disorder broke out, to which he himself fell a victim, together with a great part of his army. In 1297 he was canonized by Boniface VIII. See CRUSADES.

LOUIS XI (1423-1483), king of France, son of Charles VII. On his father's death, in 1461, he assumed the crown. The great object of Louis was the consolidation of France, the establishment of the royal power and the overthrow of the great vassals. In achieving this end he was very successful, although the means he used were unscrupulous. He encouraged manufactures and trade, and did much for the good of his kingdom, but was cold-hearted, cruel and suspicious. In 1481 Louis, who had been twice affected by apoplexy and was haunted by the fear of death, shut himself up in his castle and gave himself over to superstitious and ascetic practices.

LOUIS XII (1462-1515), king of France from 1498 until his death. He was the son of

Charles, Duke of Orleans, grandson of Charles V, and came to the throne on the death of Charles VIII, whose widow he married. In Italy he conquered the Duchy of Milan, took possession of Genoa and fought with Ferdinand the Catholic for the kingdom of Naples. He also took part in the League of Cambrai against the Venetians, whom he defeated at Agnadello. In 1510, however, he had to face the Holy League, formed against him by the Pope, Venice, England and the Swiss. He was beaten at Novara by the Swiss, and by the English at the Battle of the Spurs. He married, a short time before his death, Mary, the sister of Henry VIII of England.

LOUIS XIII (1601-1643), king of France, the son of Henry IV, ascended the throne in 1610, under the regency of his mother, Maria de' Medici. In 1614 Louis was declared of age, but for three years longer his mother managed to keep the power in her hands. She was at length banished from court, and the chief authority fell into the hands of various ministers. From 1624 Louis was almost completely under the guidance of Cardinal Richelieu, whose policy of oppression of the Huguenots brought on a war. Eventually Rochelle, the headquarters of the Huguenots, was captured (1628), and the revolt was put down. Louis was induced by Richelieu to take part in the Thirty Years' War, and he gained frequent successes over the Austrians and Spaniards, adding Alsace to France.

LOUIS XIV (1638-1715), king of France, known as **LOUIS THE GREAT** and the **GRAND MONARCH**. His reign was the longest in the world's history, and when he was at the height of his power his court was the most splendid in all Europe. Louis was an autocrat, and his official policy may be summarized in the famous expression accredited to him: "I am the State."

He was the son of Louis XIII and Anne of Austria, and succeeded his father in 1643. His minority was occupied by the continuation of wars against Austria; by war with Spain; by the struggles of the Parlement against the regent and Mazarin, and by the bloody troubles of the Fronde. In 1659 peace was concluded with Spain, and Louis married the daughter of Philip IV of Spain. On the death of Mazarin, in 1661, the king resolved to rule without a minister. He reformed the administration and the method

of raising taxes and chose as his chief adviser the famous Colbert, who accomplished a series of financial reforms, created the Company of the Indies, made roads and canals and founded manufactories. In 1662 Louis purchased Dunkirk from the needy Charles II of England. On the death of the king of Spain he claimed Franche-Comté, Luxemburg and various provinces of the Netherlands and invaded those territories, Turenne and Condé leading his armies. In 1672 he declared war with Holland, and in a few weeks he had conquered three provinces; but the formation of an alliance by the emperor, William of Orange, Spain and Denmark checked his ambition. Still the Treaty of Nimeguen (1678) left Louis in possession of Franche-Comté and a part of Flanders.

He was at this period at the height of his glory. His wife died in 1683, and Louis secretly married Madame de Maintenon about 1684. She is said to have had a considerable part in the revocation of the Edict of Nantes, which proved most unfortunate for France, by driving many industrious Protestants into exile. Louis's ambitious designs continued, and led, in 1689, to the formation of the League of Augsburg by Spain, Holland, England, the emperor and various small states. A general war continued with frequent and severe losses to the French till the Peace of Ryswick (1697), by which Louis was forced to restore all of his recent conquests and most of the acquisitions made since the Peace of Nimeguen. The question of the Spanish Succession once more brought Louis into conflict with a united Europe. The principal episodes of the war were the defeats of the French at Blenheim, Ramillies and Malplaquet; but circumstances favored Louis, and hostilities were terminated by the Peace of Utrecht in 1713, without altering the relative position of the combatants. His brilliant reign left France impoverished and most of its industries languishing. Louis was succeeded by his great-grandson, Louis XV.

Related Subjects. Consult the following titles for additional information:

Fronde	Nantes, Edict of
Marlborough, Duke of	Succession Wars
Mazarin, Jules	Utrecht, Peace of

LOUIS XV (1710-1774), a king of France, great-grandson and successor of Louis XIV, began his reign in 1715, but did not actually assume the government himself

till 1723. In the interval the country was under the regency of the Duke of Orleans, by whose folly it was brought to the verge of ruin. In 1726 Louis placed his tutor, Cardinal Fleury, at the head of the administration. In 1725 the king had married Maria the daughter of Stanislas Leszczynska, the dethroned king of Poland, and in 1733 he became involved in a war in support of his father-in-law's claims. After two campaigns he acquired for Stanislas the duchy of Lorraine. After the death of Charles VI, in 1740, the War of the Austrian Succession broke out, in which the victories of Count Maurice of Saxony gave new splendor to the French arms; and by the Peace of Aix-la-Chapelle, in 1748, France regained its lost colonies. Through Madame de Pompadour, under whose influence Louis had fallen, the Jesuits were declared a society hostile to France, and in 1764 by royal edict the order was suppressed throughout the French dominions.

From 1769 Louis was under the influence of Madame du Barry, who is said to have cost the royal treasury in five years 180,000,000 livres. The Seven Years' War (1756-1763), in which France was involved, brought severe losses and humiliation to the country, and at the king's death France was completely demoralized. See DU BARRY.

LOUIS XVI (1754-1793), king of France, grandson and successor of Louis XV. He was the victim of the excesses of the French Revolution, the seed for which were sown by his ancestors. Louis ascended the throne in 1774, on the death of his grandfather, and soon proved himself a man of honest intentions but of little ability. He could not comprehend the situation of affairs, and the reforms which he instituted were by no means sufficient to check the general discontent. A succession of incapable financial ministers brought matters from bad to worse, and even the popular Necker was unable to maintain order. At last, in 1789, all the grievances and discontents which had been gathering during a long period of misrule found vent; the populace attacked and destroyed the Bastille and the revolution was accomplished.

In June, 1791, the position of the king had become so perilous that he attempted to escape, but he was intercepted at Varennes and forced to return. Among the events which followed were the attack of the popu-

lace of Paris on the royal palace, June 20, 1792; the king's arrest in the National Assembly, to which he had fled for refuge, and finally, his trial before the convention, where he replied to the charges with dignity and presence of mind. On January 16, 1793, he was declared guilty of a conspiracy against the freedom of the nation; on the following day he was condemned to death, and on January 21 he was guillotined. His wife, the beautiful Marie Antoinette, perished in October of the same year. See FRENCH REVOLUTION; MARIE ANTOINETTE.

LOUIS XVII (1785-1795), titular king of France, second son of Louis XVI, who was executed during the French Revolution. On the death of his elder brother, in 1789, he became dauphin, and on the death of his father he was proclaimed king by the royalists, but he was soon afterward separated from his mother and delivered to a shoemaker named Simon, a fierce Jacobin, who treated the boy with the most unfeeling barbarity. He survived this treatment only two years.

LOUIS XVIII (1775-1824), king of France, brother of Louis XVI, known before his accession to the throne as Monsieur. After the death of Louis XVI (which see), Monsieur proclaimed his nephew king of France as Louis XVII, and on the death of the boy he was himself proclaimed by the émigrés, king of France and Navarre. For many years he led a wandering life, supported by foreign courts and by some friends of the House of Bourbon. He at last took refuge in England and lived there till the fall of Napoleon opened the way for him to the French throne. He entered Paris in May, 1814; he had to flee on Napoleon's escape from Elba, but was replaced on the throne by the allies after Waterloo. He was weak in character, but his government was most despotic.

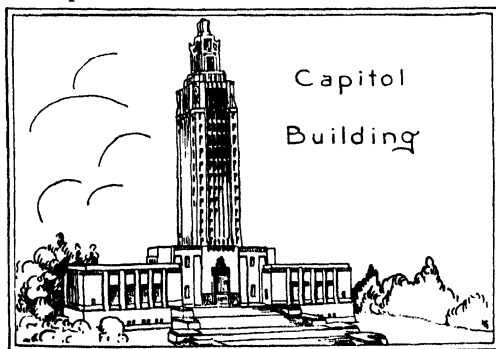
LOUIS, THE GERMAN (about 805-876), the son of Louis the Pious and grandson of Charlemagne (which see). In 843, by the Treaty of Verdun, which divided the domain of Louis the Pious, the younger Louis acquired the whole territory east of the Rhine, which formed the nucleus of modern Germany. In 858 Louis invaded France and conquered the country, but found it impossible to unite the East and West Franks, and was obliged to give up his conquest. He fought with the Normans in the northwest,

and the Bulgarians to the southeast of his dominions. In 870 he compelled his brother Charles the Bald to sign the Treaty of Mersen, by which the territories of their other brother, Lothair, were divided between the West Frankish and German kingdoms. The sons of Louis inherited his empire.

LOUISBURG, *loo'is burg*, SIEGES OF, two famous sieges about the village of Louisburg, Cape Breton Island. The place had been strengthened by the French until it was considered the strongest citadel in the New World, but was taken by a British and colonial force during King George's War in 1745, the French surrendering about 1,600 men. It was restored by the Treaty of Aix-la-Chapelle, but was again besieged in 1758, during the Seven Years' War, and again captured. The British destroyed the fortifications.

Louisburg is situated on the Atlantic coast of Cape Breton Island and has a fine harbor, but it has become of little importance, save as a shelter from storm. Population, about 1,000.

LOUISE, LAKE, a lake of the Canadian Rockies, celebrated throughout the world for its beauty. It is situated in Alberta thirty-four miles northwest of Banff and two miles from Laggan, on the Canadian Pacific. An imposing château hotel is maintained at Lake Louise by the railway for tourists, and the place may be reached by automobile or electric cars. The lake lies at an altitude of 5,645 feet, and is surrounded by lofty mountains and steep cliffs. The quiet surface of this small body of water reflects all the transient colors of the sky and mountains, and in its changing hues is lovely beyond description.



LOUISIANA, *loo e ze ah' nah*, called the CREOLE STATE and the PELICAN STATE, is one of the Gulf States and is thirtieth in

size among the states of the Union. Its land area is 45,409 square miles. Its population in 1930 was 2,101,593, making it the twenty-second state in number of people, and giving it a density of 46.3 persons to the square mile. The magnolia is the state flower.

North of Louisiana is Arkansas; Mississippi is east and Texas is west. Along the entire southern border is the Gulf of Mexico, and into this flows the mighty Mississippi River. It forms half of the eastern boundary, then flows southeast through the southern half of the state, past Baton Rouge and New Orleans. The state is 280 miles long from north to south; its greatest width from east to west is 290 miles.

The People. This section of the Union was settled by the French and remained a colony of France until 1803 (see LOUISIANA PURCHASE). To-day a large proportion of the native white people are descendants of the early families from France, and evidences of French dominion are very pronounced, particularly in New Orleans. Of the foreign population, those of Italian birth are most numerous. In that city live nearly one-fifth of all the people of the state; nearly 40 per cent of the population is in cities. There has been a large immigration of Italians.

Surface and Drainage. Louisiana is one of the lowest and most level states in the Union. The highest land consists of ridges which cross the central northern counties and nowhere exceed 500 feet in altitude. The land along the Mississippi and other rivers consists largely of flat plains, and the southern portion of the state is a Gulf plain, extending inland sixty miles or more. Many cities thirty miles inland are but ten to fifteen feet above sea level. A line drawn east and west north of Lake Pontchartrain through Baton Rouge, thence a little to the southwest, practically separates this plain from the higher land, which is somewhat rolling and hilly.

No other state has so many miles of navigable water as Louisiana. The Mississippi is the great state waterway. The Red River crosses the state from the northwest and joins the Mississippi, while the Ouachita enters near the northeastern corner and flows southward to near the middle of the state, before joining the Red. All of these streams are navigable, while the southern part of the state is cut up by bayous, which are really

broad estuaries of streams, all of which are navigable.

Louisiana contains many lakes. Those in the Gulf plain on the south are really shallow arms of the sea, and their water is salt or brackish. In the interior, along the rivers, are numerous lakes which are really lagoons that were formerly in river channels but have been cut off by changes in river courses. Such lakes are usually in the form of arcs of a circle and are connected with streams. Along the Red River in the northwestern part of the state are numerous lakes, which have been formed from the tributaries to the stream. These have had their outlets closed by the gradual rising of the river bed through continual deposit of sediment.

Climate. Louisiana has a semi-tropical climate, though, owing to the nearness of the Gulf the intense heat is modified and the climate is equable. The average temperature is about 68° in the southern part, and about 65° in the northern, while in the summer the thermometer may rise as high as 100°. The coldest weather usually is in February, and frosts occur from the first of November until the first of March. The entire state has an abundance of rainfall, averaging nearly 60 inches in the southern half and about 50 inches in the northern section. In this district the climate partakes of a continental character but is usually moderate without sudden changes.

Natural Resources. Mineral resources are valued at between sixty and seventy million dollars a year. They include petroleum with a yield of about 20,000,000 barrels a year, natural gas, carbon black, sulphur, great deposits of salt, gravel and limestone. Large deposits of many minerals have not yet been explored. The coal region is an extension of the Texas field. Salt is secured from the island of Petite Anse and from the marshes on the coast; production runs up to 500,000 tons a year. For many years the mines of Calcasieu parish produced nearly all of the sulphur obtained in the United States, but their production has practically ceased. Carbon black is produced at the rate of 125,000,000 pounds annually. There are also deposits of limestone and gypsum; mineral springs produce water valuable for medicinal purposes.

Louisiana is an outstanding state in the production of furs—muskrat, mink, raccoon and opossum; the number runs up to 6,000,-

000 or more annually, with an average value of a dollar apiece. Fish, shrimp and oyster production amounts to nearly \$7,000,000. There are seemingly more varieties of game birds than are found in any other state; here is the winter home of hosts of migratory game birds.

Forests. Fifty per cent of the land area is forest. In one year 4,100,000 feet of lumber were cut; the annual revenue has reached as high as \$154,000,000. Forty per cent of the labor of the state has been employed in the lumber industry. The state has ranked from second to fourth in this industry with the largest cutting of longleaf pine, red cypress and hardwoods. Laws for rehabilitating the forests are as complete and efficient as any devised in the nation.

Agriculture. The soil and climate of the state are favorable to the growth of many crops produced in semi-tropical regions; Louisiana is the leading state of the Union in the growth of sugar cane and rice. These crops prevail in the southern part of the state, the rice fields occupying much of the swamp land west of the Mississippi. North of the region devoted to sugar cane is the area devoted almost wholly to cotton, but as a cotton state Louisiana ranks about eighth. The annual yield varies from 600,000 to 900,000 bales. Other important crops are corn, oats and fruits, which are now extensively cultivated for Northern markets. But little attention is given to the raising of live stock, though the state raises nearly all the horses and mules needed for tilling the soil.

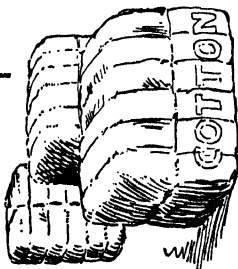
Average yields in important crops are for potatoes 2,000,000 bushels, peanuts 10,000,000 pounds, pecans 1,000,000 pounds, strawberries 25,000,000 quarts, figs 1,500,000 pounds. The total annual value of all crops has reached as high as \$50,000,000.

Manufactures. The refining of sugar is the leading manufacturing industry. This is followed by the making of cottonseed oil and cake and the preparation of lumber. Industries of less importance include the manufacture of tobacco products, bags, foundry and machine shop products; the raising and shipping of oysters employ a large number of people along the coast.

Transportation and Commerce. About 5,000 miles of navigable waterways give access to almost all parts of the state. There about 5,000 miles of railway. Thus the state has ready access to 55,000 miles of rail sys-



MAGNOLIA
STATE FLOWER



OYSTERS

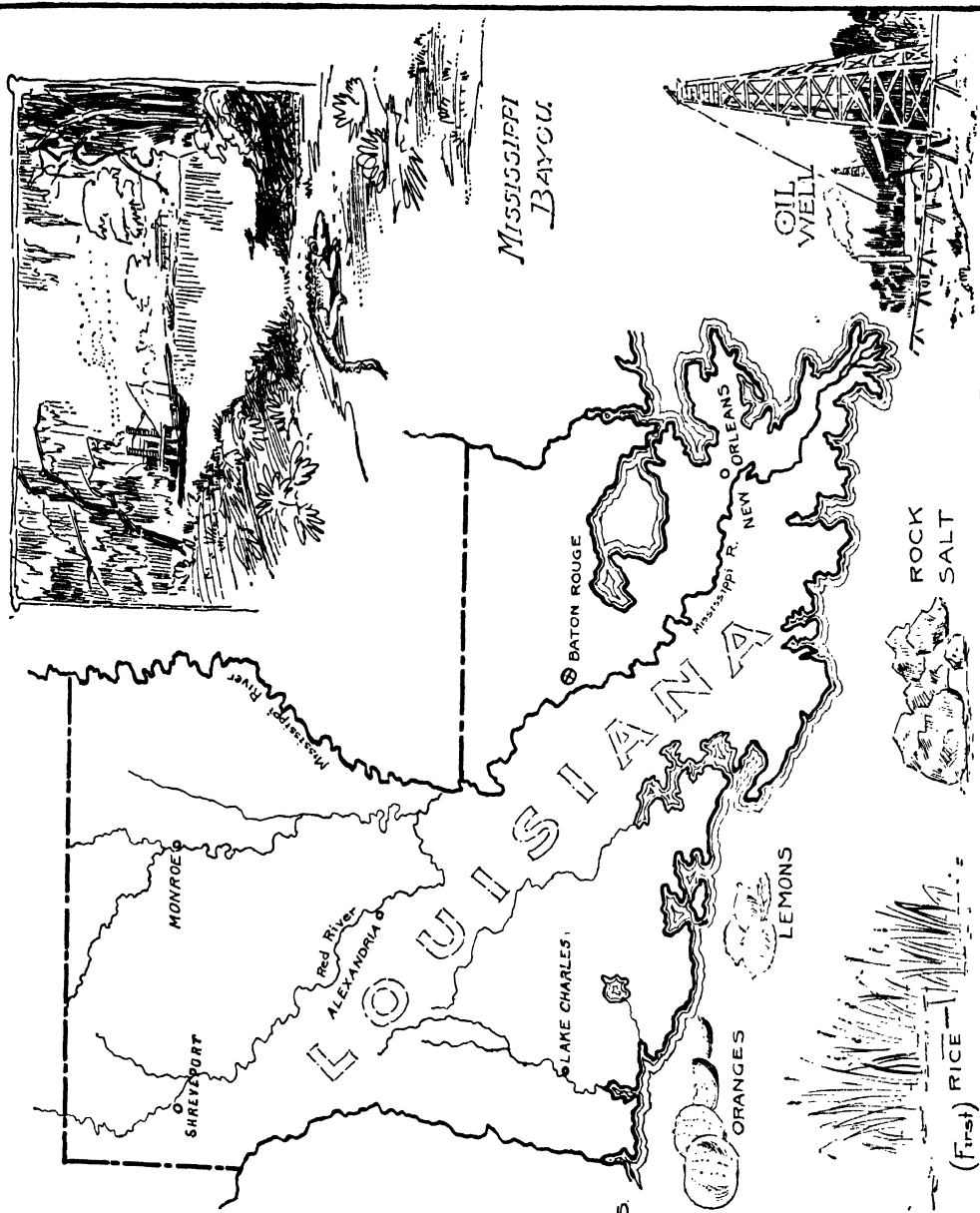
PINEAPPLES



(first)
SUGAR
CANE



(First) RICE



MISSISSIPPI
BAYOU

OIL
WELL

ROCK
SALT

LEMONS

ORANGES

tems which enter New Orleans and 13,000 miles of waterways in the Mississippi and its tributaries. Shreveport is second to New Orleans as a railroad center.

Government. The legislature consists of a senate that cannot exceed forty-one members, and a house of representatives that cannot exceed 115 members. The members of each branch are elected for four years. The executive department consists of a governor, a lieutenant governor, an auditor, a treasurer and a secretary of state, each elected for four years. The judicial department consists of a supreme court, a court of appeals and district courts. The supreme court comprises one chief justice and four district justices appointed by the governor and senate for a term of twelve years. The state is divided into four supreme court districts. The court of appeals is composed of two district judges appointed by the supreme court. There are about thirty judicial districts, in which district judges hold court.

Local government is unique and differs very materially from that found in any other state of the Union. This is due to the fact that Louisiana was settled by the French, who, previous to the Louisiana Purchase, had thoroughly established their laws and institutions, most of which have been retained, with but little modification. The state is divided into sixty parishes, the equivalent of counties in other states. The laws are based on the Code Napoleon.

Education. Public schools are provided for both white and colored children. Facing great difficulties the state is increasing the number and efficiency of the public schools; property values have arisen to some \$60,000,000. About twenty institutions give advanced instruction. Among these are the state university at Baton Rouge, Tulane and Loyola universities at New Orleans, Louisiana Polytechnic at Ruston, Centenary College at Shreveport, Louisiana College at Pineville, Southwestern Louisiana Institute at Lafayette, four colleges for Negroes, and a teachers' college at Natchitoches.

Institutions. The state schools for the blind and deaf are at Baton Rouge. Charitable hospitals are maintained at New Orleans and Shreveport, and the asylum for the insane is at Jackson. A Soldiers' home is in New Orleans. Convicts are kept busy on an 8,000-acre farm and a 2,800-acre sugar plantation, both owned by the state.

Cities. The chief cities are Baton Rouge, the capital; New Orleans, Shreveport, Lafayette, Lake Charles, Alexandria and Monroe.

History. Louisiana was first visited by Europeans about 1519, when Alvarez de Pineda and his companions entered the mouth of the Mississippi and spent six weeks on its banks. In 1541 De Soto, the Spanish adventurer, explored the coast west of Florida to the Mississippi River and visited the country on both sides of the river where New Orleans now stands. In 1682, La Salle descended to the mouth of the river, took possession of the country and named it Louisiana, in honor of his king, Louis XIV.

The first permanent settlement was made in 1699 by d'Iberville at Biloxi, now in Mississippi. In 1718, the charter of the Company of the West (see LAW, JOHN), was registered in Paris, and the commerce of Louisiana was granted to it for twenty-five years. In the same year, Bienville, the governor of the colony, founded New Orleans. In 1733 France declared Louisiana a royal province, and in 1763, by secret treaty, it ceded to Spain all that portion which lay west of the Mississippi, together with the city of New Orleans and the land on which it stood. On the same day France ceded to Great Britain all the rest of her territory in America. In 1800, Napoleon restored Louisiana (including all the vast territory west of the Mississippi River) to France, and in 1803 he sold the province to the United States for \$15,000,000. Louisiana, with its present area, was admitted to the Union in April, 1812, the eighteenth state.

In the War of 1812, New Orleans was attacked by the English and was bravely defended by about 5,000 men under General Jackson (see NEW ORLEANS, BATTLE OF). The progress of the state from the close of this war until the Civil War was rapid. Baton Rouge became the capital in 1852. Louisiana passed the Ordinance of Secession December 23, 1860, and in 1861 it ratified the Confederate constitution. New Orleans was occupied by Union forces after May, 1862, and the state suffered severely from the cessation of commerce. During the period of reconstruction, Louisiana was the scene of long-continued excitement, extending through Hayes' administration. Bloodshed was frequent. In 1868, the state ratified the Fourteenth Amendment, and in 1877 a new constitution was adopted. After a

Items of Interest on Louisiana

The flood plains of the rivers are protected against overflow by 1,500 miles of levee on the Mississippi and on its tributaries and other rivers; this system of levees was built almost entirely since the Civil War and represents an investment of nearly \$50,000,000 for the original cost of construction alone.

"Trembling prairies"—land that trembles when men or cattle pass over it—are common near the coast; these are plains of matted vegetable mold resting on water, peat, or quicksands.

Of native flowers the best known and commonest are water lilies, water hyacinths and irises, roses, japonicas, poinsettias, jasmines, camellias, oleanders and chrysanthemums.

The fisheries of Louisiana rank next to those of Florida among the Gulf states.

The state leads the country in the production of rice, Arkansas holding second place.

The unit of local government is the "parish," corresponding to the county in northern states; the parish is based on an early Spanish division for religious purposes, as the names of the saints among the parishes would indicate.

Questions on Louisiana

What is the average density of population?

Into what parts may the surface of the state be divided?

What is a "bayou"?

What part of the total area is formed by the lowlands?

What are the three main classes of lakes?

What are the most important mineral products?

Name the three leading crops? What part of the total value of agricultural products do they form?

In what ways is New Orleans unique?

Why is New Orleans called the "Crescent City"?

long contest in 1891, the state lottery was abolished. The state has also been concerned with the establishment of peaceful and satisfactory relations between the white and black races.

In 1898 a so-called "Grandfather's Clause" in the amended constitution sought to center political control in the white race. In 1908 a state railroad commission was authorized. The workmen's compensation laws have recently received several amendments, and the assignment of wages for debt is regulated by law. In 1927 1,300,000 acres of land were flooded; 300,000 persons were rendered temporarily homeless.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Alexandria	Monroe
Baton Rouge	New Orleans
Lake Charles	Red River
Mississippi River	Shreveport

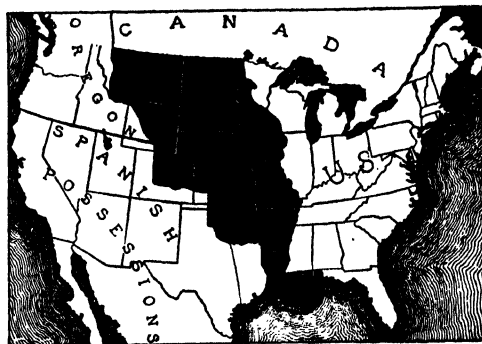
GOVERNMENT AND HISTORY

Code Napoleon	Grandfather's Clause
Louisiana Purchase	Reconstruction

MISCELLANEOUS

Cotton	New Orleans
Jetty	Rice
Levee	Sulphur

LOUISIANA PURCHASE, one of the most important events in American history, the purchase from France of the vast American territory known as the province of Louisiana. The transaction took place in 1803 in Jefferson's administration, and marked a new era of expansion for the United States. The area of the territory was 1,172,000 square miles. It included almost



LOUISIANA PURCHASE

In black.

all of the area that now constitutes fourteen states, whose present population is over 24,000,000.

The purchase was brought about by the discovery, in 1802, that Spain had ceded Louisiana to France by a secret treaty in

1800. This caused the greatest uneasiness on the part of American statesmen, since they felt that this event was merely a step in France's policy to regain its foothold in America. In order to prevent the carrying out of this plan, President Jefferson urged the purchase of the territory at the mouth of the Mississippi from France, in order that the Mississippi might be the boundary between the territory of the two nations. Robert R. Livingston was dispatched to accomplish this purchase and was met by a proposal on the part of Napoleon to sell the entire Province of Louisiana. An agreement was finally made by the promise of the United States to pay eighty million francs to France and to assume the debts of Americans to French citizens, amounting to twenty million francs. The agreement was signed April 30, 1803, and was ratified October 20. Though Jefferson believed such a step was unconstitutional and at first urged the passage of a constitutional amendment, the unanimity among the people in favor of it finally led him to accept the result. The total cost to the United States, including principal, interest and debts, was about \$27,500,000.

LOUISIANA PURCHASE EXPOSITION, a world's fair, held at Saint Louis, Mo., in the summer of 1904, in celebration of the one-hundredth anniversary of the transfer of the territory of Louisiana from France to America. The site chosen for the exposition was Forest Park, consisting of more than 1,000 acres, in the western portion of the city. In this enclosure fifteen mammoth exhibition buildings were erected, arranged in the shape of a fan. The pivotal point was occupied by three domed buildings, from the center of whose base flowed a broad stream of water, which fell in cascades over a green background seventy feet in height to the grand basin below. Special care and skill were used in the distribution and designing of the buildings to produce a truly artistic scene, and the result exceeded all expectations in this respect.

The total cost to the exposition company before the opening of the gates was nearly \$20,000,000, of which \$5,000,000 was donated by the United States government, \$5,000,000 by the city of Saint Louis, and \$5,000,000 by the citizens of Saint Louis. In addition, the United States government spent \$1,500,000 on its own exhibit and \$1,000,000 on the

exhibit of Filipino life and products. Forty-two states were represented by buildings and special exhibits, costing more than \$7,000,000, while many of the most important foreign nations also erected buildings, at a cost of fully \$7,000,000. The total attendance reached 21,000,000.

LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, a state university at Baton Rouge, the outgrowth of a seminary and military academy founded near Alexandria in 1853. In 1860 the institution was opened, with William Tecumseh Sherman as president. Nine years later the school was removed to Baton Rouge, and in 1870 its name was changed to Louisiana State University. In 1877 the institution was merged with the Agricultural and Mechanical College founded at New Orleans in 1873, and the combined school was then chartered under its present name. It maintains courses in the arts and sciences, mechanical and civil engineering, agriculture (including a special course in the cultivation and manufacture of sugar), law and teaching. There is also a graduate school. Five experiment stations are connected with the university; they are maintained at Crowley, Baton Rouge, Calhoun, Hammond and Saint Joseph. The faculty numbers about 200, the students about 4,100. The libraries have 143,000 volumes.

LOUIS PHILIPPE, *loo é fe leep'*, (1773-1850), king of the French. He was the eldest son of Philippe, Duke of Orleans, surnamed Egalité, and during his father's lifetime he was known as the Duke of Chartres. He entered the army in 1791 and, favoring the popular cause in the Revolution, took part in the battles of Valmy and Jemappes and distinguished himself at Neerwinden. At the Revolution of July, 1830, he was made "lieutenant-general of the kingdom," and in August he became king of the French.

He was but slightly concerned about the ceremonies of royalty, but at heart clung firmly to kingly power. His aggressive tendencies came into plain view when he felt himself secure on the throne. By marriages and political understandings he sought to establish his family among the royalties of Europe. He reigned for eighteen years, but his rule was popular with no class of people and the Revolution of 1848 drove him from the throne. He went to England, where he remained till his death.

LOUISVILLE, *loó y vil* or *loó is vil*, Ky., the largest city in Kentucky and one of the most important manufacturing cities in the South, is situated on the Ohio River, 400 miles above its mouth and 130 miles southwest of Cincinnati; it is the county seat of Jefferson County. It is served by the Baltimore & Ohio, the Chesapeake & Ohio, the Chicago, Indianapolis & Louisville, the Cleveland, Cincinnati, Chicago & Saint Louis, the Illinois Central, the Louisville & Nashville, the Pennsylvania, the Southern and the Indiana railway systems.

The Mississippi Valley Barge Line maintains weekly departures up and down the river between Cincinnati and New Orleans. The Ohio River Transit Company ships freight daily to Cincinnati. The Greene Line and the American Barge Line also serve the city. Two electric lines reach into adjoining areas. It is served by a municipal airport and by scores of bus and truck lines radiating in all directions. A terminal belt line aids greatly in the shipment of commodities.

Industries use the 135,000 horse-power hydro-electric plant and the 125,000 horse-power steam plant, with rare advantages in access to coal and oil. Manufactures include cigars, cigarettes, plumbing equipment, railroad shop products, bakery goods, refined oil, agricultural implements, furniture and fixtures, electrical machinery and dental goods. Industrial plants number about 700; they pay about \$40,000,000 in wages annually.

The tobacco industry is especially important; it thrived during the years of depression and in one year multiplied two and one-half times.

Institutions. The important buildings and institutions include the public library, the institute for the blind, the armory, the memorial auditorium costing \$1,250,000, the Kentucky Home Life building, the mausoleum of Zachary Taylor, the Roman Catholic Cathedral, Christ's Church Cathedral, the Second Presbyterian Church, the Temple Adas Israel, the University of Louisville with about 2,500 students, the college of pharmacy, the Jefferson Law School, the Baptist and the Presbyterian theological seminaries and the Louisville College for Negroes.

The city maintains twelve parks and seventeen playgrounds covering 2,400 acres; there are three municipal golf courses, 71 tennis courts and three public swimming pools.

Shawnee Park contains 21 baseball diamonds.

History. The city was founded by George Rogers Clark; a stockade was built in 1778 by Clark's men on the site of Louisville. The name was chosen to commemorate the aid given by Louis XVI of France during the American Revolution. The town was chartered in 1780. Clark made his home at Clarks-ville, Indiana, just opposite Louisville. For a long time after 1890 the city often doubled its population every ten years; by 1900 the population had grown to 200,000. With the decline in the sales of liquor the prosperity of the city suffered. This was checked by the organization of the Louisville Industrial Foundation; idle factories were engaged in new lines of production and the crisis of the city was passed.

Heroes of local and national history have been commemorated by monuments suitably placed: Thomas Jefferson, Abraham Lincoln, Daniel Boone, John B. Castleman, Henry Clay and George D. Prentice.

In 1929 the plan of government was revised in a way that gives more responsibility to fewer officials; the ballot was shortened and the government placed in the hands of a mayor and twelve aldermen. The mayor appoints the heads of departments: finance, works, safety, welfare, health and law. Nearly one-fifth of the families are Negroes. Population, 1930, 307,745.

LOUSE, the common name of a group of insects that suck the blood of man and animals. The common louse is furnished with two simple eyes, one on each side of its head, and a mouth adapted to sucking. The legs are short, with short claws or with two opposing hooks, which give a very firm hold. The body, which is composed of eleven or twelve distinct segments, is flattened and nearly transparent. The young pass through no metamorphosis, and they multiply rapidly. Human beings are infested by both head and body lice, and the latter sort were the cause of great misery to the armies during the World War; the soldiers called them "cooties." The following remedies are recommended for ridding the hair of lice and "nits":



LOUSE,
MUCH
ENLARGED

To rid the hair of lice saturate the hair thoroughly with tincture of larkspur. Rub in well. Be careful not to let the mixture get into the eyes or into scratches. Wrap the

head in a bath towel. Leave on for six hours. Then wash the head thoroughly. Take two quarts of hot water and add one teaspoonful of carbonate of soda. Wet the hair with this mixture. Soap thoroughly with castile soap for ten minutes. Wash the soap out with plenty of warm water. If "nits" are abundant, repeat the above several times.

To rid the hair of "nits" mix equal parts of kerosene oil and olive oil. Rub the mixture well into scalp. Then cover the hair with a piece of muslin and fasten it about the head, avoiding contact with a lighted gas jet or flame of any kind. The following morning the scalp should be washed with soap, hot water and vinegar. A fine toothed comb wet in vinegar should be used to remove the "nits." Dry the hair thoroughly with a towel. This treatment should be repeated three or four times.

LOUVAIN, *loo vaN'*, BELGIUM, a city in the province of Brabant, eighteen miles east of Brussels, on the Dyle River. In 1914 the Germans burned about one-fifth of the city in retaliation for alleged attacks on German soldiers by civilians (see WORLD WAR). The fire spared the townhall but destroyed the famous university; the few scholars and professors who were not serving in the army accepted the invitation of the University at Cambridge to use its equipment.

Louvain was famous in the fourteenth century for its cloth-making that employed 1500 workers. Civic strife ended this prosperity, but the university brought new fame to the city with its 6,000 resident students in the 16th century. Since the university halls and the famous library were destroyed in the World War, Americans in 1929 furnished an architect, funds for rebuilding and endowing the library, and a carillon, the gift of American engineers. Over 600,000 volumes have been accumulated of which the John Rylands Library of Manchester, England, contributed more than 50,000. Population about 40,000.

LOUVRE, *loo'vr'*, a group of magnificent buildings in Paris, on the Seine, and the world's greatest gallery of art. It was begun in 1204 and was used at various times as fortress, prison and castle. Francis I, after 1541, erected that part of the palace which is now called the old Louvre, and the buildings have been enlarged and adorned by successive kings, particularly by Louis XIV, until little trace of the original buildings remains.

The new Louvre was begun by Napoleon I, as a museum for the art treasures which he obtained from the nations he conquered, and

was completed by Napoleon III in 1857. The whole group of buildings is distinguished by its great extent and by its elegant and sumptuous architecture. It contains paintings, among which are masterpieces of Murillo, Titian, Michelangelo, Delaroche, Bonheur and others; drawings; engravings; bronze antiques; sculptures, ancient and modern, together with special collections of antiquities and an ethnographic collection. Visitors flock to this most extensive of all galleries and stand in awe before Da Vinci's *Mona Lisa* of the inscrutable face; they view with rapture such marbles as the armless *Venus de Milo* and the *Winged Victory of Samothrace*, most perfect examples of sculptured art.

LOVEJOY, ELIJAH PARISH (1802-1837), an American reformer, born at Albany, Maine. He was graduated at Princeton Theological Seminary in 1833, and became editor of the *Saint Louis Observer*, a Presbyterian paper, soon afterward. He soon took an active interest in the anti-slavery agitation and incurred the displeasure of pro-slavery citizens of Saint Louis. He therefore removed his plant to Alton, Ill., but it was seized and destroyed. Two other presses were also destroyed by mobs, and finally, on November 7, 1837, another mob attacked a warehouse containing a fourth press guarded by Lovejoy and his friends. In the *mêlée* Lovejoy was mortally wounded. The event caused the greatest indignation throughout the North and was the occasion of the first great anti-slavery address of Wendell Phillips.

LOVER, SAMUEL (1797-1868), an Irish novelist, poet and artist, born in Dublin. He first devoted his attention to painting, but afterward turned to literature. He at first wrote songs and ballads, and later he published several novels, which he illustrated with his own pencil. Among his works are *Legends and Stories of Ireland*; *Rory O'More*, a famous ballad; *Songs and Ballads*, and the novels, *Handy Andy* and *Treasure Trove*. *The Angel's Whisper* and *The Low-backed Car* are among his popular songs.

LOW, SETH (1850-1917), an American administrator and educator, born in Brooklyn, N. Y., and educated at Columbia. He began his business career as a clerk in his father's store, where he rose to the position of partner. He early manifested an inter-

est in public affairs and was the organizer and first president of the New York Bureau of Charities. In 1881 Mr. Low was elected mayor of Brooklyn on an independent ticket, and was reelected. His administration was characterized by a radical reform in all departments of city administration, and, especially, by the advancement of the public schools. In 1889 he was elected president of Columbia, and during his administration the work of the institution was thoroughly reorganized and placed on a university basis; the college was located on its present site, and its name was changed to Columbia University. He was appointed one of the members of the United States delegation to the Hague Peace Conference, and from 1902 to 1903 he was mayor of Greater New York. His administration was characterized by extensive reforms.

LOWELL, ABBOTT LAWRENCE (1856–), an American educator, a nephew of James Russell Lowell. He was born in Boston and educated at Harvard University and Harvard Law School. From 1880 to 1897 he practiced law in Boston; from 1897 to 1899 he was lecturer on government at Harvard and in 1900 he was appointed professor of the science of government. In 1909 he was chosen president of Harvard to succeed President Eliot, and he held this important post for 25 years. President Lowell is known for his broad scholarship and his administrative ability. He is the author of *Government and Parties of Continental Europe*, *The Government of England* and other standard works on the science of government. He retired in 1934.

LOWELL, AMY (1874–1925), an American poet and critic, born in Brookline, Mass. The sister of the astronomer, Percival Lowell, and of Abbott Lawrence Lowell, president of Harvard, she came of a family of intellectual prominence. Miss Lowell was educated privately. She began writing verse in 1902, waiting eight years before she permitted a poem of hers to be published in the *Atlantic Monthly*. Her first volume of poems, *A Dome of Many Coloured Glass*, was issued in 1912, and her second, *Sword Blades and Poppy Seeds*, in 1914. Among other volumes are three posthumous collections of verse—*What's O'clock*, *East Wind* and *Ballads for Sale*. Miss Lowell was a leader in expressing the new poetic forms of her generation—unrhymed cadence (free

verse) and polyphonic prose, as she termed them—but she was equally at home in the older verse forms, and her poetry suggests the sensuous beauty associated with Keats, as well as the unfettered meter of Walt Whitman. Her best prose work, a life and critique of Keats, was published in 1925.

LOWELL, JAMES RUSSELL (1819–1891), America's most versatile man of letters, distinguished as poet, critic, essayist, orator and diplomat. He was born in Cambridge, Mass., in the family mansion "Elmwood," which may be seen to-day in its elm-shaded grounds. At the age of sixteen he entered Harvard University, and though much of the curriculum was distasteful to him, he received his degree in 1838. Lowell studied law after graduation and was admitted to the bar in Boston, but early abandoned the legal profession for literature. In 1843 he helped to found a short-lived monthly magazine, *The Pioneer*, which was unsuccessful in spite of such contributors as Hawthorne, Poe and Whittier.

Meanwhile he had been trying his hand at poetry, having published a small volume of lyrics in 1841, dedicated to his fiancée, Maria White. After their marriage, in 1844, she induced him to use his talents in promoting the cause of freedom, and the result was the first series of the famous *Biglow Papers*, published in 1848. In this same year he published *The Vision of Sir Launfal*, his best-known poem, and the *Fable for Critics*, which, in spite of its frolicsome tone, shows much real critical power. In 1855 Lowell was appointed to succeed Longfellow as professor of modern languages at Harvard, and he spent two years abroad preparing for the duties of that position. In 1857 was founded the *Atlantic Monthly*, of which Lowell was the first editor, and he was also during the years that followed a frequent contributor to the *North American Review*. Lowell's first wife died in 1853, and four years later he married Miss Frances Dunlop.

Meanwhile, his writings had brought him before the public as an independent supporter of the Republican party, and in 1876 he was made a Presidential elector. In the following year he was appointed by President Hayes minister to Spain, and three years later he was transferred to England, where he remained until 1885. During this service he did much toward bringing the American and British people together.

Besides the works mentioned above, Lowell produced a second series of *Biglow Papers*, dealing with the Civil War; *The Commemoration Ode* to the Harvard graduates who died during the war, which is one of the most beautiful poems of its kind ever written; *Under the Willows*, a volume of verse issued in 1869 and containing many of his best poems; *The Cathedral*, his longest poem, which is of very uneven merit and into which he introduced, in the midst of the most serious passages, prankish humor. The chief elements which make Lowell's poetry great are its sound common sense and its vigorous expression. It is not evenly beautiful, as is that of Longfellow, and it is, like his prose work, often so crowded with literary references and allusions as to be difficult reading. Among his chief prose works are *Fire-side Travels*, which abounds in pleasant fancy; and *My Study Windows* and *Among My Books*, two volumes of criticisms which show that he is entitled to rank with the best of American critics. Consult biographies by Underwood, Edward Everett Hale and Horace E. Scudder.

In the article **READING** will be found additional facts about Lowell's life and work.

LOWELL, Mass., one of the county seats of Middlesex County, twenty-five miles northwest of Boston, on the Merrimac River at the mouth of the Concord River and on the New York, New Haven & Hartford and the Boston & Maine railroads. Lowell maintains a commercial airport.

The city is one of the world's centers of textile manufacture. The principal products are woollens, cotton goods, worsteds, silk, leather, corduroys, fertilizer, upholstering, boxes, machinery, furniture and medicines.

Important institutions include the Lowell Textile Institute, the high school, the memorial auditorium, Rogers Hall for girls, a teachers college, Notre Dame Academy and five hospitals.

The 50 parks and nine playgrounds with the municipal bathing beach comprise 227 acres and are valued at \$1,326,000.

The Merrimac River has a fall of 32 feet at this point; the Canal and Lock Company completed the first system of canals in 1825 but the first mill was erected in 1823. Lowell was founded by the Merrimac Manufacturing Company in 1826. The settlement grew rapidly and was incorporated as a town in 1826 and as a city ten years later. Lucy Larcom,

the author, lived in Lowell and worked in the mills. This is also the birthplace of James McNeill Whistler, the artist.

The commission form of government was adopted in 1912 but later the mayor and council were restored. Population, 1930, 100,234, a decrease of 11 per cent in ten years.

LOWER CALIFORNIA, a long, narrow peninsula extending southeast from the American state of California, with the Gulf of California on the east and the Pacific Ocean on the west. It is a part of the republic of Mexico, and has a total length of about 750 miles; the width varies from thirty to 140 mi. Mexicans call it Baja California.

The peninsula is not a valuable possession, for the rainfall does not average more than ten to fifteen inches a year, and the climate is usually hot. The surface is mountainous, for almost the entire area is an extension of the Sierra Nevada Mountains. The largest city is LaPaz. Population, 1930, 94,469.

At times there has been serious discussion as to the desirability of the purchase of Lower California by the United States, as a safeguard against uses of the peninsula which would be prejudicial to American interests.

LOW GERMAN. See **PLATDEUTSCH**.

LOYO'LA, IGNA'TIUS OF (1491-1556), the founder of the Order of the Jesuits, was born at the castle of Loyola, in Spain. His baptismal name was INIGO LOPEZ DE RECÁLDE; his historical name was adopted after his conversion. In his youth he entered the army; during the defense of Pampeluna in 1521, against the French, he was severely wounded, and a long and tedious confinement was the result. During his convalescence he read several religious books, which caused him to change the whole course of his life. He renounced the world, made a formal visit to the



LOYOLA

shrine of the Virgin at Montserrat and vowed himself her knight. After his dedication he made a pilgrimage to Rome and Jerusalem; then he attended the schools and universities

of Barcelona, Alcala and Salamanca. On completing his studies he went to Paris, where he went through a seven years' course of general and theological training. Here, in 1534, he formed the first nucleus of the Society of Jesus, or Jesuits, which afterward became so famous.

François Xavier, professor of philosophy, Lainez and others, in conjunction with Loyola, bound themselves together to devote themselves to the care of the Church and the conversion of infidels. Rome ultimately became their headquarters, and Loyola submitted the plans of his new order to Pope Paul III, who, under certain limitations, confirmed it in 1540. Loyola continued to reside in Rome and governed the society he had constituted till his death. He was beatified in 1607 by Paul V and was canonized in 1622 by Gregory XV. See JESUITS.

LUBBOCK, JOHN, Sir, Baron Avebury (1834-1913), a British scientist and statesman, born at London and educated at Eton College. In 1848 he joined his father, Sir John William Lubbock, a famous astronomer and mathematician, in the banking business, and in 1856 he became a full partner in the firm. In this profession he became conspicuous and held many responsible positions under the government, in connection with financial and educational affairs. In 1870 he was elected as a Liberal to Parliament, and with the exception of a brief period he continued to be a member until 1900. During the latter years of his service he acted with the Liberal Unionists. Upon retiring from Parliament, he was made a peer, as the first Baron of Avebury. Besides being responsible for the passage of many important financial and educational measures, he won distinction as an archaeologist and anthropologist. He published many volumes, of which the most important are *Prehistoric Times*; *Origin of Civilization*; *Ants, Bees and Wasps*; *Flowers, Fruits and Leaves*; and *The Senses, Instincts and Intelligence of Animals*.

LU'BECK, GERMANY, a city of Germany, one of its three city states (with Bremen and Hamburg) until state boundaries were eliminated in 1934 by the Nazi government, and these became merely administrative units under control of the Cabinet, in common with all other political divisions of the Reich. Lübeck lies ten miles southwest of the mouth of the Trave River, which flows into the

Baltic Sea, and forty miles by rail northeast of Hamburg. The city has been eclipsed in importance by Hamburg, Bremen, and Stetten, but carries on a thriving trade in lumber, grain, coal and other commodities with Denmark, Sweden and England, and Lübeck is known as a commercial rather than a manufacturing city. The older portion of the place has a distinctly medieval aspect, with its quaint gabled houses, picturesque brick churches and spired public buildings. It is a notable educational center. Population, 1933, 129,420.

LUCERNE, *loo surn'*, SWITZERLAND, capital of a canton of the same name, situated on the banks of Lake Lucerne. It is a very popular tourist resort on account of the beauty of the surrounding country and the picturesqueness of the city itself. There are several ancient buildings, an arsenal with old armor, a gallery of art, a museum of antiquities and numerous interesting modern buildings. One of the chief points of interest is the famous Lion of Lucerne (which see), a symbol of fidelity. Population, 1931, 47,066.

LUCERNE, LAKE OF, in Switzerland, bounded by the cantons of Uri, Schwyz, Unterwalden and Lucerne, and noted for its magnificent scenery and historical associations. It is nearly in the shape of a cross, the bays of Lucerne, Küsnacht and Alpnach forming the head and arms, and the Bay of Buochs and the Lake of Uri forming the main body. Its length from Lucerne to Fluelen is twenty-three miles; from Alpnach to Küsnacht, at the extremities of the arms, about fourteen miles; its width is from one-half to two miles, and its greatest depth is 700 feet. It is a favorite resort for tourists.

LU-CHU. See LOO-CHOO.

LUCIFER, *lu'se fur*, a name anciently given to the planet Venus, as the morning star. The term is used figuratively by Isaiah (XIV, 12) and is applied to the Babylonian king, but it was mistaken by the commentators for a reference to Satan. In Milton's *Paradise Lost* Satan is called Lucifer.

LUCKNOW, *luk'now*, BRITISH INDIA, capital of a district in the United Provinces of Agra and Oudh, and the oldest of the great cities of India. It is situated on the south bank of the Gumti River, forty-two miles northeast of Cawnpore and 666 miles northwest of Calcutta. It ranks tenth in

size among British Indian cities; three-fifths of the people are Hindus. Although its streets are narrow and dirty and many of its buildings are small and mean, the city is from a distance picturesque and imposing in appearance, as there are minarets and domes on many of the larger buildings. Since the British gained control a number of improvements in sanitation and building have been put into effect.

Lucknow was one of the chief scenes of the Sepoy mutiny in 1857. At the beginning of the mutiny the residency was fortified by Sir Henry Lawrence, and after his death it was closely besieged by the rebels till relief was brought by Havelock and Outram. The relieving force was only a small one, however, and the British were again besieged. In the middle of October Sir Colin Campbell gained possession of the place after severe fighting and made it possible for the garrison to leave the city. In March, 1858, the British permanently recovered the city. Population, 1931, 274,659.

LUCRETIA, *lu kre'she ah*, in Roman legendary history, the virtuous wife of Tarquinius Collatinus, who was outraged by Sextus, son of Tarquinius Superbus, king of Rome. After telling her husband and father of her wrong, she stabbed herself, and her death was the signal for a revolution, by which the Tarquins were expelled from Rome and a republic was formed.

LUDENDORFF, ERICH (1865-), a German military leader who gained a reputation in the World War second only to that attained by Hindenburg. He was born in Posen. His father was a gentleman-farmer of moderate means, and the boy received a good education, entering the cadet school at Plön at the age of twelve. In 1882 he was commissioned a junior lieutenant in an infantry regiment, five years later was transferred to the Marine Corps, and in 1890 began a three-year course in the Berlin War College. After his graduation Ludendorff was sent to Russia to make military observations, and so efficiently did he perform this task that on his return he was promoted to a captaincy. Within a few years he reached the rank of colonel.

Soon after the outbreak of the World War Ludendorff was promoted to the rank of major-general and was appointed chief of staff to General von Emmich, who led the German troops in the invasion of Belgium.

While he was assisting in this campaign he was called to aid General von Hindenburg in the defense of East Prussia, which had been invaded by Russians. Ludendorff contributed materially to the brilliant victory of Tannenberg, and was rewarded by being appointed lieutenant-general and Hindenburg's chief of staff. In August, 1916, he was made general of infantry, and subsequently became first quartermaster-general of the German forces. In this capacity, during the last two years of the war he exercised dictatorial powers over Germany's economic and industrial activities, and he welded the army and people into one great war machine. With his chief, General Hindenburg, he planned the last offensive of Germany on the Western Front, and his resignation, late in October, 1918, was a definite proof of the passing of the old order. Ludendorff possessed remarkable organizing ability, and it was said of him and his chief that one was the brain, the other the arm, of the German offensive power. In 1921 he published *The General Staff and Its Problems* and *My War Memories, 1914-1918*. See WORLD WAR.

LUDWIG, EMIL (1881-), a German biographer with a lesser reputation as a dramatist, was born in Breslau. His education fitted him for the law, but his preference was for literature, which career he followed. Early efforts were dramatic; he produced several plays before the World War, then during that struggle was in the employ of the German government as official reporter in German-speaking sections of Europe. The biographies which gave him eminence were *Napoleon*, *William Hohenzollern*, *Lincoln*, and *Schliemann*; other books biographical in character were *Nine Etched from Life* and *Leaders of Europe*. He also wrote *The Son of Man* and a book of travel sketches, *On the Mediterranean*; his most famous dramatic effort was a trilogy of plays centering around the life of Bismarck, founder of the German Empire.

LUKE, SAINT, the evangelist, author of the Gospel which bears his name and of the *Acts of the Apostles*. He was probably born at Antioch, in Syria, and was taught the science of medicine. He is supposed to have been one of the seventy disciples and was also one of the two who journeyed to Emmaus with Jesus after the resurrection (*Luke XXIV, 13-35*). He was for several years a companion of the apostle Paul in his travels,

so that in the *Acts of the Apostles* he relates what he himself had seen and participated in.

LUMBA'GO, rheumatism or rheumatic pains affecting the muscles of the loins. The disease is usually the result of intestinal fermentation or other infection in the body. It is likely to recur after the first attack and may even become chronic. The pains may be sharp and intermittent or dull and steady. The attack lasts from a few hours to several weeks and often disables and weakens the sufferer for longer periods. Warmth and rest constitute the best treatment, but in severe cases the care of a physician is desirable.



LUMBER, the general term applied to all timber cut into various forms for commercial use. More specifically, however, it relates to boards, planks, lath, shingles, joists, etc. Other forms included in the general definition are telegraph poles, railroad ties, and the like. The manufacture of lumber constitutes one of the most important and one of the most extensive industries in the world.

Lumber Producing Countries.

The principal lumber producing countries of the world are the United States, Canada, Russia, Sweden, Norway, Germany and France, but some tropical sections furnish many beautiful varieties of timber, such as mahogany, ebony and rosewood, which are chiefly used in furniture making. Russia and Sweden are the only important European exporters of lumber; most of the other nations, especially Great Britain and Germany, import large quantities, or produce just enough for their own use. With the increasing demands for lumber there has been a corresponding increase in the varieties of wood available for industrial purposes. Substitutes have been found for many varieties formerly in use; and such substitutes have often proved better than the varieties they displaced.

Divisions of the Industry. The lumber industry is divided into three branches, as follows:

(1) The logging industry, including the felling of timber, cutting it into lengths, and transporting it by rail or by river to the mill.

This industry is carried on in part by individuals, who own or operate the sawmills. The raw material of this industry consists of standing timber; the finished product consists of logs delivered at the mill.

(2) The sawmill industry, in which the raw material consists of saw-logs, and the product of rough lumber, including beams, joists, scantlings, boards, shingles and laths.

(3) The planing mill industry, in which the raw material consists of rough lumber, and the finished products of planed, with such minor manufactures as are carried on in connection with these mills. Some of the planing mills are operated in connection with sawmills, while others are under separate ownership and management.

Cutting the Timber. In some of the lumber regions the cutting of timber is carried on only during the winter months, because it is at this time that the logs can be more economically transported than at other seasons. The lumbermen during the logging time live in camps, which are usually constructed of logs and consist of buildings in which the men sleep, a kitchen and dining room, one or more stables for the horses, and a blacksmith shop. The men of the camp are organized into squads, each in charge of a foreman and assigned to a special line of work. One squad fells the trees, which is done by sawing them off near the ground, instead of chopping them, as formerly. Another squad cuts trees into logs; still another hauls the logs to the river or to another suitable place, from which they are transported to the mills, while another may have charge of the roads over which the logs are hauled. The general foreman, or superintendent, has oversight of all the work, selects the trees to be cut and sees that each squad performs the work assigned to it in a satisfactory manner.

River-driving, that is, floating the logs down stream to the mills, is still practiced wherever possible, but as the timber supply near the rivers is being exhausted, other means of transportation have been used. The logs are sometimes carried out of the woods by teams over temporary log roads. In the mountain forests enormous loads are drawn on sleighs by single pairs of horses—the roads are previously flooded and frozen, so that the surface is icy. In the South and West temporary railroads are sometimes built into the forests to transport the logs. In the far West machinery is used to a far greater extent than in the East on account of great size of the timber. Donkey engines

and traction engines are used in the woods for handling logs and for dragging logs over roads to the railway. For loading logs on the cars cranes are commonly used.

The Source of Supply. The lumber industry of the United States and Canada may be roughly divided into two sections, eastern and western, separated by the relatively treeless plains of the central valley. The eastern forest is characterized by the predominance of broad-leaved trees and by the uniformity of its types over large areas. In the western forest the cone-bearing trees or pine family predominate; the individual species, moreover, often reaches enormous dimensions, the forest is frequently interrupted by treeless areas, and the transitions from one type to another are often abrupt.

The eastern forest may be conveniently divided into three sections: first, the northern, which produces chiefly maple, birch and beech, among the hardwoods, and white pine, spruce and hemlock among the cone-bearing; second, the southern, chiefly oak, white cedar and yellow pine; third, the central hardwood, chiefly chestnut, hickory, ash and other hardwoods already mentioned. The western division is also divided into two sections; first, the Pacific coast, whose characteristic trees are the redwood, Douglas fir, sugar pine, and western hemlock; second, the Rocky Mountain, with western yellow pine and spruce.

In the Sawmill. The sawmills contain all the machinery necessary for working the logs into the finished lumber. Circular saws, band saws and gang saws are common in the largest mills. The gang saw consists of a number of saws attached to an iron frame which moves up and down. The space between the saws is the same as is desired for the thickness of the board or plank to be cut, and each gang contains enough saws to convert the log into lumber as it passes through them. While a mill of this pattern seems to work slowly, yet because of the number of saws employed it manufactures more lumber in the same time than any other mill. All of the waste product is used. The slabs and poor boards are cut into lath; the bark, sawdust and other waste go to feed the fire in the boiler, so that practically nothing is wasted. Since lumber shrinks in drying, it must be thoroughly seasoned before it can be used, and many large mills contain drying kilns, or chambers in which the boards are stacked and subjected to the influence of hot air for a number of

Outline on Lumber

I. KINDS

- (1) Hardwood — mahogany, rosewood, ebony, etc.
- (2) Soft woods—pine, cedar, etc.

II. SAW MILLS

- (1) Location
 - (a) Lumber camps
 - (b) Seaports, inland cities
- (2) Methods of sawing and handling trees
 - (a) Large timber — Machinery
 - (b) Small timber—Oxen, etc.
 - (c) Transporting to mill
- (3) Product
 - (a) Rough lumber—logs, poles, planks.
 - (b) Finished lumber
 - (c) Finished articles

III. TRANSPORTATION OF LOGS TO DISTANT SAW MILLS

- (1) Methods
 - (a) Rafting
 - (b) Shipping by rail or water

IV. DRYING

- (1) Kilns
- (2) Sun dried

V. PURPOSES

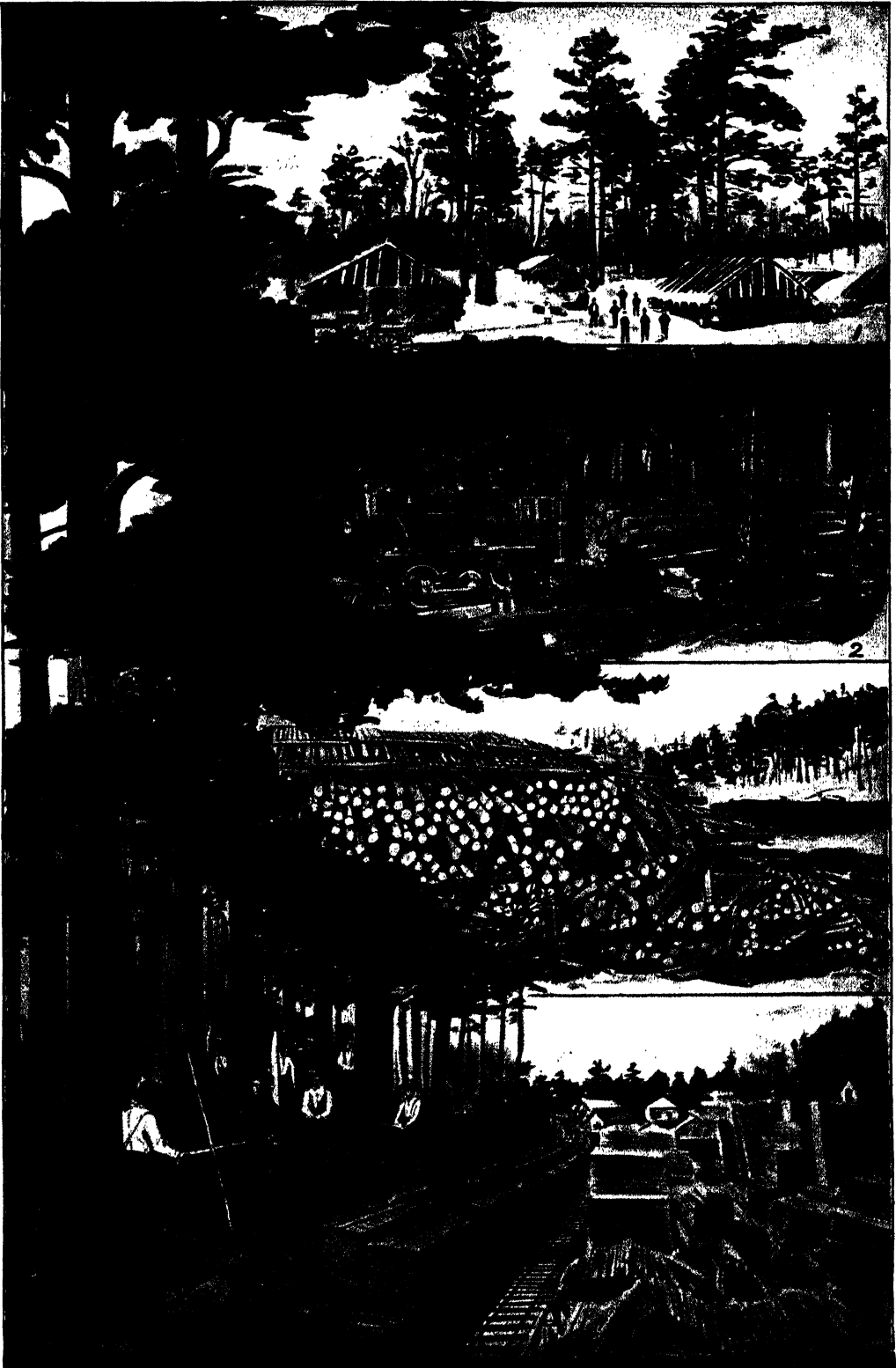
- (1) Buildings—public and private
- (2) Railways—all equipment of wood, etc.
- (3) Ship building and yards, etc.
- (4) Furniture, etc.

VI. LUMBER PRODUCING COUNTRIES

- (1) Canada—British Columbia, Ontario, Quebec, other provinces
- (2) United States—Wisconsin, Michigan, Minnesota, Washington
- (3) Other — South America, Sweden, Russia, Germany, France, Mexico, Canada, Africa

VII. COMMERCIAL

- (1) Fourth industry in United States



1, Lumber Camp
2, Log Train

LUMBER
3, Log Pile by Lake.

4, Felling Trees.
5, Lumber Yard and Mill



Travel Magazine

BREAKING A LOG JAM IS EXCITING AND HAZARDOUS

When the jam is broken and the thousands of logs begin to move downstream, the lumber-

days. Some mills also contain planing mills and other finishing machinery, so that the lumber can be manufactured into any desired form for manufactured articles before leaving the mill.

Extent of the Lumber Out. The greatest annual cut was once in New England, from which section it shifted to Pennsylvania, then to Michigan. Later the South led, but within the last few years the far West has dominated the industry. Michigan's greatest yearly cut was 4,311,240,000 board feet, in 1890. The states of Washington and Oregon, the two now leading in production, exceed this cut practically every year. The total lumber cut in the United States ranges from 15,000 million to 37,000 million board feet yearly. The production of Southern pine is decreasing rapidly.

How Lumber is Measured. All the operations of the lumber trade in the United States and Canada are influenced by the peculiar unit of measure which has been adopted. This unit is the board-foot. It is generally defined as a board one foot long, one foot wide, and one inch thick, but in practice it is equivalent to one hundred forty-four cubic inches of manufactured lumber in any form. To purchase logs by this measure, one must know how much one-inch timber each log will yield. For this purpose a scale or table is used, which gives the number of board feet of logs of various lengths and diameters. Under this system the buyer pays for nothing but the salable lumber in each log, without any expense for the waste in slabs and sawdust.

Lumbering in Canada. In the article CANADA this subject is discussed.

Related Articles. Consult the following titles for additional information:

Building Lath Shingles
and articles relating to all timber trees, as Pine, Oak, Hickory, Cedar, Birch, Mahogany, Rosewood, etc.

LUMPFISH, or LUMPSUCKER, a fish, so named from the clumsiness of its form. The back is arched and sharp, the belly flat, the body covered with numerous bony tubercles and the ventral fins modified into a sucker, by means of which the fish can stick firmly to anything. Before the spawning season it is of a brilliant crimson color, mingled with orange, purple and blue, but afterward it changes to a dull blue or lead color. It sometimes weighs seven pounds. The lumpfish is not a valuable food fish.

LUMPY JAW, or LUMP JAW, a disease of cattle, usually manifested by the appearance of swellings on the lower jaw, though it affects other parts of the body. It is caused by a fungus which is found on grasses and on the awns of barley, spears of oats and other grains. These occasionally penetrate the gums of cattle, and the fungus lodges in the tissue and grows, producing tumors or abscesses. When opened and examined, these are found to contain minute grains, varying in color from pale yellow to a sulphur yellow. These granules are imbedded in the soft tissue composing the tumor or in the pus of the abscess. The presence of the fungus causes sufficient irritation to propagate these inflammatory growths. The disease progresses rather slowly, but unless checked it often produces ulceration of the jawbone, causing displacements or even loss of teeth. Without assistance the animals seldom recover.

It is supposed that the disease is contracted from food infected with the fungus. The treatment consists in lancing or removing the tumors and also in treating with solutions of iodide of potassium and iodine. The latter method is usually the more effective and has the advantage that it can be applied by any one, while the surgical operation can be undertaken only by a trained veterinarian.

LU'NA, the Latin name for the moon, whom the ancients worshiped as a goddess. To the Greeks she was known as *Selene*. Her worship is said to have been introduced among the Romans in the time of Romulus. Later the qualities of Luna were transferred to Diana (which see), and the latter became the moon goddess.

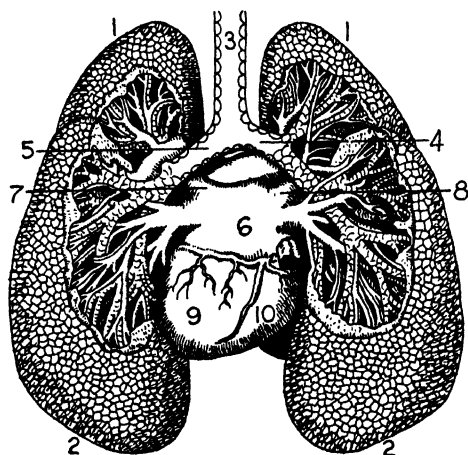
LUNACY, *lu'na se*. In law, "a lunatic is one that hath had understanding, but by disease, grief, or other accident, hath lost the use of his reason." This definition is from Blackstone. In the United States, Canada and most other countries there are special laws dealing with lunacy. The statutes provide that lunatics may be put under guardianship, provided lunacy is proved before a competent court. Until the contrary is shown, every man is presumed to be sound of mind. In criminal cases lunatics are not chargeable for their acts, but they may be sued and can sue, in the name of their guardians, for civil wrongs. See **INSANITY**.

LUNAR CAUSTIC, a chemical preparation, composed of nitrate of silver, and made

into little sticks, which are white or grayish in color and turn black on exposure to the air. Lunar caustic is used extensively in surgery, because of its antiseptic qualities and its power to burn away diseased tissue, warts, or such formations as the membrane in diphtheria. Lunar caustic is sometimes used in making black hair dyes and indelible inks.

LUNDY'S LANE, BATTLE OF, an important battle of the War of 1812, fought at Lundy's Lane, about one and a half miles from Niagara Falls on the Canadian shore, July 25, 1814. The American force was commanded first by General Scott and then by General Jacob Brown, and faced a superior force under General Reall. The Americans were the aggressors and first gained an important advantage, but the result after an all-day's struggle was probably a drawn battle. The loss on each side was about 850.

LUNGS, the most important of the organs of breathing. They occupy in man the greater part of the cavity of the chest and are separated from each other by the oesophagus, the heart and the large blood vessels. Though



THE LUNGS

- 1 Summit of lungs
- 2 Base of lungs
- 3 Trachea
- 4 Right bronchus
- 5 Left bronchus
- 6 Left auricle of heart
- 7 Left superior pulmonary vein
- 8 Right superior pulmonary vein
- 9 Left ventricle of heart
- 10 Right ventricle of heart

these organs occupy so large a space they are the lightest, according to size, of any in the body, weighing in man about three and one-half pounds, in woman two and three-fourths pounds. The color varies with the age of the individual, being pinkish at birth,

slate colored and mottled in adult life and of a still darker tint in old age. Each lung is partially subdivided into lobes, the right into three, the left into two, and each lobe is made up of a large number of tiny lobules.

The two lungs are united at the top of the windpipe, or trachea, which divides into a right and left bronchus after its entrance into the cavity of the chest. Within the lungs are found the divisions and subdivisions of the bronchi, or the bronchial tubes. The minute terminal branches of these tubes open into tiny air cells. A dense network of capillaries lies outside the cells, so that between the air in the cells and the blood in the capillaries there are but the two very thin walls, and often there is only a single layer of capillaries between adjoining cells, thus exposing both sides of the blood vessels to the air. The blood vessels and bronchial tubes, together with nerves and lymphatics, also found in the lungs, are embedded in elastic tissue.

The special function of the lungs is to keep the cells of the body supplied with oxygen, and to help expel from the body carbon dioxide. When air is drawn in, in the act of breathing, oxygen is supplied to the lungs. This oxygen seeps through the walls of the air cells and the tiny blood vessels, and from them it goes into the blood stream and so to all parts of the body. When the other act of breathing, or expiration, takes place, carbon dioxide, a waste material, is sent out of the body. This process is explained more fully under the heading BREATHING.

Related Articles. Consult the following titles for additional information:

Bronchitis	Physical Culture
Circulation	Pleura
Drowning	Pneumonia
Heart	Tuberculosis

LUNGWORT, a name applied to several different plants. In America the Virginia cowslip, which blooms in early spring from Southern Canada to South Carolina, is called both lungwort and bluebell (see COWSLIP). In Europe the name is given a plant bearing small purple flowers and leaves spotted somewhat like diseased lungs. It was formerly supposed to be a reliable remedy for diseases of the lungs.

LUPERCALIA, *lu per ka'li a*, a Roman festival, celebrated annually in honor of Lupercus, an ancient pastoral god, afterward identified with Pan. It was celebrated on February 15 at the Lupercal, a grotto in the Palatine Hill at Rome. Goats were sacri-

ficed, and two youths, arrayed in goat skins, ran through the streets of the city striking with leather thongs all the persons they met.

LUPINE, *lu'pin*, a very extensive genus of hardy plants, belonging to the pea family, some of which are cultivated in gardens for the sake of their gaily-colored flowers. These plants are found in the temperate parts of the Americas, and are of value to the farmer because they add nitrogen to the soil.

LU'PUS, tuberculosis of the skin. It manifests itself in the formation of reddish pimples, found usually on the cheeks near the nose. These pimples generally form ulcers, which leave noticeable scars. Lupus is a disease of childhood and youth. Victims should be under the constant care of a reliable physician, who will prescribe nourishing food, fresh air, exercise and medicine like cod-liver oil. The X-ray has been found helpful for local treatment.

LURAY' CAVERNS, a series of underground galleries in Page County, Va., near Luray. Most of the hundreds of chambers have not yet been explored. The cave is considerably smaller than the Mammoth Cave of Kentucky, as it underlies only about 100 acres, but it affords a wonderful display of stalactites.

LURTON, HORACE HARMON (1844-1914), an American jurist who received appointment as Associate Justice of the Supreme Court of the United States. He was a native of Kentucky, entered the Confederate army and was a major at the close of the Civil War. Becoming a lawyer, he rose to distinction in his profession in Tennessee, and was made a justice of the supreme court in his state. President Cleveland appointed Lurton a Federal judge, where he formed a friendship with a brother United States judge, William Howard Taft. Later he became professor of constitutional law at Vanderbilt University. When Taft became President he appointed Lurton to the Supreme Court post, in 1910, where he served until his death, about four years later.

LUSITANIA, a British passenger ship owned by the Cunard Company, which was torpedoed without warning by a German submarine, on May 7, 1915. The ship carried 1,257 passengers, including women and children, and a crew of 702, a total of 1,959 people. Of these, 1,198 perished. There were 102 Americans lost, including such well-known persons as Charles Frohman, theatri-

cal manager; Charles Klein, playwright; Alfred G. Vanderbilt; Elbert Hubbard, author and lecturer; and Justus Miles Forman, novelist. The sinking of the vessel shocked the civilized world, and it marked the definite turning of American sympathy toward the cause of the allies. From that time German propaganda was a losing venture in the United States. The disaster called forth a vigorous protest from the American Department of State, and was the occasion of much diplomatic correspondence between Germany and the United States. The German defense was that passengers had been warned not to sail on enemy merchant ships, that the *Lusitania* was armed, and that it carried ammunition. This charge was proved to have been used merely as a subterfuge.

Because the German people placed supreme confidence in their leaders and knew nothing of current opinion except as it was carefully prepared for them, they did not during the war understand the horror with which civilization viewed the atrocity. Later, when confronted with the true feeling, they professed amazement.

LUTE, a stringed musical instrument, similar to a guitar, formerly very popular in Europe. It consists of four parts: namely the table or belly, with a large round hole in the middle; the body, ribbed like a melon, with nine or ten ribs, or divisions; the neck, which has nine or ten stops, or frets, which divide the strings into semitones; and the head, or cross, in which are fitted the pegs, or screws, for tuning the strings. There are a dozen pairs of strings, each pair tuned in octaves or in unison. The strings are struck by the fingers of the right hand, and the sounds are regulated by those of the left, which manipulate the frets.

LUTHER, HANS (1879-), a German statesman, educated in law and in the science of municipal administration. He was appointed burgomaster (mayor) of Essen, and after the World War, when French troops occupied the Ruhr Valley, he was conspicuous because of his refusal to bow to any superior authority within his jurisdiction. Luther was minister of food and minister of Finance in two Cabinets; his most conspicuous service was to represent his country at the Locarno Conference (which see). Though not a disciple of Hitler, in 1933 he was appointed German ambassador to the United States.



Home in
Frankfort-on-the-Main

LUTHER, MARTIN (1483-1546), the founder of Protestantism, was born at Eisleben, in German Saxony. He was of poor parentage, his father being a miner. When but twenty years of age he was graduated as master of philosophy at Erfurt in Thuringia; in 1505 he entered the monastery of the Augustinians at Erfurt, and two years later was consecrated priest. The following year, by the influence of his patron, Staupitz, who was district vicar of the order, Luther was made professor of philosophy in the

new university of Wittenberg. At first he lectured upon the philosophy of Aristotle, but soon turned his attention to the Bible, and his lectures on this subject attracted so much attention that Staupitz prevailed upon him to preach regularly in the monastery church at Wittenberg. In 1512, upon his return from a visit to Rome in the interests of his Order, he was made doctor of theology and began his famous lectures on Paul's *Epistles*. His first original work, the *Exposition of the Seven Penitential Psalms*, was published in 1517. Meanwhile, he had been made district vicar of the Augustinians and then preached not only in the convent chapel, but also in the parish church.

During these years he had worked zealously for the Church and in the interests of his order, but in 1517 a Dominican priest, Johann Tetzel, appeared in the vicinity of Wittenberg, selling indulgences, or the remission of temporal punishment for sin. The proceeds were to go toward the building of Saint Peter's, at Rome. Just at this time the dedication of the Schloss-kirche was being celebrated at Wittenberg, and, as it was customary upon special days to nail upon the church doors bulletins of general interest to the parish, Luther on the evening before the fete-day placed upon the door of the Schloss-kirche ninety-five theses. These were called forth by Tetzel's abuse of the Church doctrine regulating indulgences. Their tone was, however, moderate, and it seems that at this time Luther contemplated no break with the

Church. By means of the press, the theses were distributed through Europe, and all the continent was soon plunged into a tumult of controversy.

Luther, meanwhile, devoted himself to the further study of the Bible, Church history and canon law, in order to defend the position he had taken. His study resulted in his drifting further and further from the Church. His public utterances and writings became bolder, and he was soon attacking the entire system and body of teachings of the Church of Rome. At first the Pope did not regard the matter as of serious import; but at length, being convinced that Luther's influence was becoming dangerous, he issued a bull against him and his friends. Luther's writings were condemned as heretical, and he himself, if he did not recant his errors in sixty days, was to be seized and sent to Rome to be tried for heresy. Luther publicly burned this communication.

In 1521 the Diet of Worms, an assembly of the princes, nobles and clergy of Germany, was convened by the Emperor Charles V to deliberate upon state affairs in general and especially upon matters touching the great religious controversy. Luther was summoned before this body and called upon to recant his errors. Refusing to do so, he was pronounced a heretic and outlaw, but was allowed to depart in safety. Frederick, elector of Saxony, conveyed him privately to the Wartburg castle, where he remained for ten months in seclusion. During this period he translated the New Testament into German. Meanwhile, serious troubles arose from the excesses of some professed followers of Luther. Castles and monasteries were sacked, and horrible outrages were perpetrated. Although a legal outlaw, Luther now came forth, temporarily checked the disturbance, then resumed his work in the Church and university; and when several years later trouble broke out afresh, he made a tour through the neighboring towns, preaching a crusade against the image breakers. His history from this time is identical with that of the Reformation.

It is thought that the rapidity with which his doctrines gained ground was due as much to his hymns as to his preaching. Among these is *A Mighty Fortress is Our God*, sometimes known as the "battle hymn of the Reformation." In 1524 Luther married Katharine von Bora, a former nun, who for

several years had been a believer in his doctrines. In the same year he established a school at Eisleben. From 1526 to 1529 he was engaged in the preparation of a new Church service, and his translation of the Bible in 1534 permanently established the literary language of Germany. See REFORMATION.

LUTHERANS, the name given in derision by the opponents of the Reformation to those who adopted the theological doctrines of Luther. Luther himself protested against this name, as his intention had been, not to form a new Church, but to reform abuses in the Church then existing. It was permanently adopted, however, by a large body of Protestants. The Augsburg Confession (which see) set forth the doctrines which are held by the Lutherans of to-day.

The Lutheran creed includes the doctrines of "justification by faith alone, universal depravity, the vicarious atonement, regeneration, progressive sanctification, a true sacramental, but not a material, presence of Christ in the Lord's Supper, and the use of both the Bible and the sacraments as means of grace." Lutheranism is the prevailing form of Protestantism in Germany and is the national religion of Denmark, Sweden and Norway.

In 1918 the three English-speaking Lutheran bodies in the United States effected a merger, the united institution adopting the name United Lutheran Church in America. All the Lutheran bodies in the United States and Canada, exceeding twenty, report baptized communicants to the number of 4,519,925, with 12,143 ministers.

LÜTZEN, BATTLES OF, two battles fought at different times in Prussian Saxony, near the town of Lützen. The first Battle of Lützen was fought in November, 1632, between the Swedes, under Gustavus Adolphus, and the imperial troops, under Wallenstein. The Swedes, although they had the smaller force, were victorious after a stubbornly-fought battle, but Gustavus Adolphus was killed. See THIRTY YEARS' WAR.

On May 2, 1813, occurred the second battle of Lützen, in which Napoleon defeated General Wittgenstein with a force of Russians and Prussians. The loss to each side was approximately 20,000.

LUXEMBURG, a small, independent grand duchy of Europe, bordering on Germany, France and Belgium. It has an area

of 998 square miles, and had 299,782 inhabitants in 1931, nearly all Roman Catholic in religion. The people are of old Teutonic stock, but for many years French has been the language of the educated classes. The peasants speak a German dialect, in which are found French words. Iron is the chief mineral product, about 3,500,000 tons being produced every year. There are also deposits of copper and lead. Agriculture is well advanced, and there is considerable stock raising. There are over 500 miles of railroad—one mile to practically two square miles of territory.

From 1815 to 1866 Luxemburg was a part of the Germanic Confederation, but in 1867 its independence was guaranteed. However, while nominally independent, German influence held Luxemburg almost in vassalage for years; its richness in iron made it necessary to Germany. Having no seaport, the grand duchy was forced into the German Customs Union and thus into economic dependence upon the Germans.

Luxemburg was invaded by German forces at the outbreak of the World War, as was Belgium, but the people of the grand duchy made no attempt to oppose the invaders. At the close of the war American soldiers entered the state on the heels of the retiring, defeated Germans, and were welcomed as deliverers from oppression. See WORLD WAR.

The ruler of Luxemburg from February 26, 1912, to January 15, 1919, was Grand Duchess Marie Adelaide (born 1894). She abdicated the throne in 1919 in the hope of preserving the sovereignty of the grand duchy, and was succeeded by her sister, Princess Charlotte Adelgonde. The new ruler was born in 1896. There is a chamber of deputies of fifty-four members, elected for six years. The city of Luxemburg is the capital.

In 1919 a referendum was taken to decide on the political and economic future of the country. The decision was to continue as an independent duchy, and to form an economic union with Belgium. The latter was concluded by treaty, removing customs barriers for 50 years.

LUXOR, *luk'sawr*, EGYPT, a village on the east bank of the Nile, on the site of ancient Thebes. Its Arabic name is El Kusur. The place is chiefly interesting because it contains the ruins of a great temple erected by

Amenophis III about 1500 B. C. Here, too, may be seen three colossal statues of Ramesses II, carved from black granite. See THEBES.

LYCEUM, *li se'um*, a gymnasium in Athens in which Aristotle and his followers carried on philosophical discussions. Its name was derived from that of a near-by temple, dedicated to Apollo Lyceus. In modern times the name *lyceum* has been given to the schools intended to prepare young men for the universities, and to organizations which maintain lecture courses of a popular or technical nature.

LYCURGUS, *li kur'gus*, the great lawgiver of the Spartans, who flourished about 900 B. C. He traveled into Crete, Egypt and Asia and thus prepared himself to give Sparta the laws which have rendered his name immortal. His object was to regulate the manners, as well as the government, and to form a warrior nation, in which no private interest should prevail over the public good. See SPARTA.

LYD'IA, in ancient geography, a large and fertile country of Asia Minor. It attained its highest prosperity in the seventh and sixth centuries B. C., especially under Croesus, who was conquered by the Persians under Cyrus, in 546 B. C. The Lydians are credited with the invention of certain musical instruments, the art of dyeing wool and the art of smelting and working ore. Sardis was the capital of Lydia.

LY'ELL, CHARLES, Sir (1797-1875), a British geologist, born at Kinnordy, Scotland. He was educated at Oxford and began the study of law, but afterward resolved to devote his time and fortune to geological research. For this purpose he visited the continent of Europe and the United States. His first important work was the *Principles of Geology*, and a portion of this book afterward formed the basis of the *Elements of Geology*. Another important work was the *Antiquity of Man*, in which he summarized the evidence in favor of the theory that the race of man was much older than was currently believed. Lyell is considered by many to be the founder of modern geological science.

LYMPH, *limf*, a colorless, nearly transparent fluid, the function of which is to provide nourishment for the growth and repair of the tissues, as well as for the storage of energy. It has a saltish taste and, on exam-

ination with the microscope, is seen to contain corpuscles resembling quite closely white blood corpuscles. The composition of lymph seems to be almost the same as that of the blood, with the exception that it does not contain any of the coloring matter found in blood. Lymph is absorbed by the *villi* of the small intestine, passes through the lacteals into the *receptaculum chyli* and thence into the thoracic duct. The formation of lymph is continuous, and it is absorbed by the tissues from the capillaries. Physiologists suppose that the amount formed is regulated to some extent by the pressure in the lymphatic vessels and that this pressure is controlled by the absorption by the tissues. See LACTEALS; LYMPHATICS.

LYMPHATICS, *lim fat'iks*, minute, transparent tubes, which originate in lymph capillaries and are found in all parts of the body except the brain, eye, spinal cord and tendons. They are so abundantly supplied with valves that when filled with lymph they present a beaded appearance. In the course of these lymphatics are glands, through which the lymph passes on its way to the blood vessels of the neck. The valves are abundant in the armpit and the groin, along the great vessels of the neck, thorax and abdomen, in the arm as far as the elbow, and under the knee. It is only after passing through these glands that the lymph is ready to enter the blood. The lymphatics of the left side of the body empty their contents through the thoracic duct into the left subclavian vein; those on the right side into the right subclavian vein. See LACTEALS; LYMPH.

LYNCHBURG, VA., in Campbell County, 124 miles west of Richmond, on the James River and on the Chesapeake & Ohio, the Norfolk & Western and the Southern railroads. There is an airport. It has a location on the hills along the river, with the Blue Ridge and the peaks of Otter Mountains for background. The surrounding region is agricultural and contains deposits of coal, iron and granite. The main industries include large tobacco factories, iron and brass works, flour and cotton mills, shoe factories, an over-all factory, and brick and tile works. Randolph Macon Women's College, Lynchburg College, and Virginia Episcopal School are located here; Sweet Briar College is nearby. The place was settled in 1786 by John Lynch and associates, and was incorporated in 1823. Population, 1930, 40,661.

LYNCH LAW, the practice of inflicting the death penalty upon men for offenses through private, unauthorized means, without legal trial. The origin of the phrase was in the name of one Charles Lynch of Virginia, who adopted this mode of punishing offenders. Lynchings are most frequent in the South, though the North in some years nearly equals the Southern record, and Negroes are more often the victims than whites. There is a strong sentiment in opposition to lynch law, and there are frequent attempts, generally unsuccessful, to punish lynchers.

LYNN, MASS., a city of Essex County, ten miles northeast of Boston, on the Massachusetts Bay and on the Boston & Maine Railroad. There is street-railway connection with Boston. The Lynn Port Authority has developed a magnificent industrial water front including 6,000,000 square feet of recovered land. The channel is 22 feet deep and connects with the ocean three miles distant.

Industries include electrical equipment, shoes, leather, machine shop products, bakeries, radio tubes and electric lamps. Over 6,600 persons are employed in producing shoes valued at \$11,000,000 yearly.

About 20,000 children are enrolled in the schools; the parks and playgrounds cover 1,940 acres. Important buildings are the English High School, the public library, the Classical High School and the building of the New England Telephone and Telegraph Company.

The city was settled in 1629 and organized as a village in 1631; incorporation occurred in 1850. Population, 1930, 102,320.

LYNX, *lynxes*, the name given to different wild cats found in North America, Europe,

thirty to forty inches in length and has stout limbs and a short, thick tail. The species found in the north is known as the *Canada*, or *red lynx*, and that in the south as the *southern lynx*, or *bob cat*. The Canada lynx is of a grizzly, brownish-gray color and has tufts of black hair on the tips of its ears and at the end of its tail. The lower part of the animal is white. The bob cat is nearer a reddish-brown, especially in summer, and its fur is marked with spots and lines, which are most distinct about the head. The lynx feeds upon small animals such as rats, mice, and sometimes upon sheep and goats. It is especially fond of poultry, and in some localities it is a pest to the farmer. The animals seek their prey by night, and during the day they sleep in small caves or hollow trees. The fur is of good quality and finds a ready sale. For this reason and because of their depredations, these animals are approaching extermination.

LY'ONS, FRANCE, the third city in population in the country, and capital of the department of the Rhône. It is situated 250 miles south-southeast of Paris and 160 miles north of the Mediterranean. Among its chief buildings are the Cathedral of Saint Jean, which dates from the fifteenth century; the Church of Saint Martin d'Ainay, which has a cupola supported by ancient Roman columns and a crypt believed to date from the ninth century; the Church of Saint Nizier, and the modern Church of Notre Dame de Fourvière.

Lyons carries on various industries, among them the manufacture of scales, clocks, perfume, soap and laces, but it is noted chiefly for its silk manufactures, which are the greatest in the world. The silk industry in the town and surrounding neighborhood gives employment to almost 150,000 people. There is a large trade by railway, river and canal. Lyons was a place of considerable importance when Gaul was invaded by Julius Caesar, and it remained the chief city of Gaul throughout the greater part of the life of the Empire. During the Middle Ages it did not lose at any time all of its importance, and Louis XIV greatly improved the city. While the French Revolution was in progress, the city suffered severely; thousands of its citizens were put to death by the emissaries of the Paris Convention, and its chief buildings were destroyed. Fortunately, it was out of the war zone in both Franco-Ger-

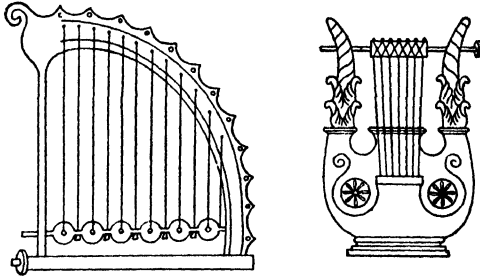


THE LYNX

and Asia north of the Himalaya Mountains. The common lynx of North America is from

man and World wars. Population, 1931, 579,765.

LYRE, *liré*, one of the most ancient stringed instruments of music, consisting of a frame, with two hornlike pieces rising from it, and a crosspiece between the horns,



TWO FORMS OF THE OLD GREEK LYRE

from which strings were stretched to the lower part of the frame. It is said to have had originally only three strings, but the number was afterward increased to ten or twelve. The lyre was common among the Egyptians, Assyrians and Greeks, and it was considered to be the favorite instrument of Apollo, the god of music and poetry.

LYRE BIRD, a very peculiar bird, living only in Australasia, where there are but three species. These birds take their name from the remarkable tails of the males, which in shape and arrangement resemble somewhat an ancient lyre. The birds are brownish, about the size of small hens, and live principally upon the ground, whence they can leap to branches many feet above ground. When running, they spread their tails out horizontally. During the breeding season the male bird is very vain, and scraping out little hollows in the ground, it struts about or dances, with erect tail and drooping wings, and sings a loud, rather pleasing song.



LYRE BIRD

LYRIC POETRY, originally, poetry sung to, or suited for, the lyre; in modern usage, that class of poetry in which are expressed the poet's own thoughts and feelings, or the emotions attributed to another, as opposed

to epic or dramatic poetry, to which a story of action is essential. There may be a lyrical element in other kinds of poetry, in epics or dramas, for example, but narrative and action have little to do with truly lyric poetry.

Among the most beautiful of English lyrics are the songs in Tennyson's *Princess*, "The Splendor falls on castle walls," "Sweet and Low," "Tears, idle tears," "As through the land at eve we went" and "Home they brought her warrior dead;" Wordsworth's *My Heart Leaps Up*, *The Daffodils* and *The Solitary Reaper*; Tennyson's *Break, Break, Break*, and *Crossing the Bar*; Holmes's *Chambered Nautilus*; Longfellow's *Hymn to the Night*; Shelley's *Cloud*; Milton's *L'Allegro* and *Il Penseroso* and Burns's *Highland Mary* and *To Mary in Heaven*. Tennyson's "Tears, idle tears" is here given entire:

Tears, idle tears, I know not what they mean,
Tears from the depth of some divine despair
Rise in the heart, and gather to the eyes,
In looking on the happy autumn fields,
And thinking of the days that are no more.

Fresh as the first beam glittering on a sail,
That brings our friends up from the underworld,
Sad as the last which reddens over one

That sinks with all we love below the verge;
So sad, so fresh, the days that are no more.

Ah, sad and strange as in dark summer dawns
The earliest pipe of half-awaken'd birds
To dying ears, when unto dying eyes
The casement slowly grows a glimmering square

So sad, so strange, the days that are no more.

Dear as remember'd kisses after death,
And sweet as those by hopeless fancy feign'd
On lips that are for others; deep as love,
Deep as first love, and wild with all regret
O Death in Life, the days that are no more!

LYSANDER (?-395 B. C.), a Spartan general who was appointed to the command of the Spartan fleet off the coast of Asia Minor in 407 B. C., during the Peloponnesian War. In 405 he defeated and captured the Athenian fleet off Aegospotamos, and thus put an end to the war. He was killed in a battle with the Thebans. See SPARTA.

LYSIMACHIA, *ly si ma'ki a*, a genus of herbs, belonging to the primrose family. Four species occur in the United States, and many others in various parts of the world. They are usually leafy-stemmed and bear yellow flowers, which in some species are large and handsome. *Moneywort* is the common name of a pretty little trailing vine that forms dense mats and has been introduced

into the United States from Europe. Its roundish, light-green leaves, bright yellow flowers and graceful trailing stems make it a favorite for growing in hanging baskets.

LYSIPPUS, *lisip'us*, a Greek sculptor who flourished in Sicily about 330 B. C., in the time of Alexander the Great. He worked only in bronze, in which he fashioned about fifteen hundred statues. Lysippus claimed to represent the human figure as it seems to be to the eye, and not as it actually is. His statues were characterized by a small head, long legs and slender figure. He became famous by his statues of Zeus, Heracles, Helios and of Alexander the Great, whom he represented many times. Celebrated colossal statues of Lysippus were those of Helios in Rhodes, Zeus in Tarentum and Poseidon in

Corinth. But few examples of his art have been preserved. Notable among them are the bronze of *Hercules* and the statuettes of *Neptune* and *Jupiter*, preserved in the British Museum.

LYTTON, EDWARD GEORGE EARLE LYTTON-BULWER. See BULWER-LYTTON, EDWARD GEORGE EARLE.

LYTTON, EDWARD ROBERT BULWER (1831-1891), an English poet and statesman, son of the novelist Bulwer-Lytton. He early attained a reputation as a poet, under the name of Owen Meredith; and he published *Clytemnestra and Other Poems*, *Tannhauser*, *The Wanderer*, *Fables in Song*, *Glenaveril*, and the highly popular *Lucile*. He also produced several prose works, including the life and letters of his father.



M is the thirteenth letter of the English alphabet. The character has come, with but little change, through the Greek and Latin from the Phoenician. *M* has in English but one sound, and it is silent only in a few foreign words, such as *mnemonic*. As a symbol, *M* means 1,000.

MAARTENS, *mahr'tenz*, **MAARTEN** (1858-1915), the pen name of J. M. W. VAN DER POORTEN-SCHWARTZ, a prominent Dutch writer of fiction. All of his novels were written in England, and they gained a wide circle of appreciative readers. In his books the reader finds interesting accounts of life in Holland among the middle classes. Maartens was born in Amsterdam, and was educated in Germany and at the University of Utrecht. His works include *An Old Maid's Love*, *God's Fool*, *Harmen Pöls*, *Price of Lis Doris* and *Eve*.

MA'BIE, HAMILTON WRIGHT (1846-1916), an American critic, editor and essayist, for thirty-two years one of the editors of *The Outlook*. He was born at Coldsprings, N. Y., and was educated at Williams College and at the law school of Columbia University. Ma-bie was associated with *The Christian Union*, later called *The Outlook*, from 1879 until his death, becoming associate editor in 1884. He wrote voluminously on nature, literature and social and ethical subjects, and was also the author of a series of books for young readers, comprising collections of myths, fairy tales and legends.

MACADAM, *ma ka'd'am*. See **ROADS AND STREETS**.

McADOO, WILLIAM GIBBS (1863-), an American lawyer and Cabinet official, Secretary of the Treasury in President Wilson's administration from March, 1913, to the end of 1918. He was born near Marietta, Ga., of an old Southern family. While in his junior year at the University of Tennessee he

left the institution to study law, and in 1885 was admitted to the bar. After practicing law for several years in Chattanooga, Tenn., he established himself in New York City in 1892, becoming the partner of another William McAdoo, not, however, a relative. While this venture was successful, he became most widely known as the builder of the tunnels under the Hudson River, connecting New York and New Jersey. To-day over 50,000,000 passengers a year make use of this great tunnel system.

McAdoo was a delegate to the Democratic national convention in Baltimore in 1912, and when President Wilson formed his Cabinet, in March, 1913, he appointed him head of the Treasury Department. His management of the Department was notably successful, and after the country entered the World War he not only directed four great Liberty Loan campaigns, but assumed new and burdensome duties as Director-General of Railways, which the government took over in December, 1917.

After the signing of the armistice, in November, 1918, McAdoo resigned; he was succeeded by Carter Glass as head of the Treasury Department, and by Walker Hines as railway director. He was elected to the United States Senate from California as a Democrat, for the term 1933-1939. In 1914 McAdoo married Eleanor Randolph Wilson, daughter of President Wilson; she divorced him in 1935, and he remarried during the same year.

McAL'ESTER, OKLA., founded in 1872 as South McAlester, is the county seat of Pittsburg County, 120 miles south of Oklahoma City, on the Chicago Rock Island & Pacific and the Missouri, Kansas & Texas railroads. It is surrounded by rich farm and stock-raising lands, and lies in the midst of the most extensive coal fields of the state. On account of cheap fuel, manufacturing indus-

tries are numerous. There are a number of wholesale houses and also cotton gins and compresses, cheese and macaroni plants. The commission-manager form of government is in operation. There are three parks, a Carnegie Library and two hospitals. The state penitentiary is located here. Population, 1920, 12,095; in 1930, 11,804.

MACARONI, *mak a ro'ni*, a preparation of wheat flour, used as food. In the manufacture of macaroni, only the hardest wheat of the best quality is used. The wheat is ground into a coarse flour and then sifted, and the flour is mixed into a dough with warm water. This is placed in a cylinder with a perforated base. By means of hydraulic pressure the dough is squeezed through the holes, and the macaroni sticks, as they come through, are cut into lengths of about three feet. The sticks are then dried in the sun or by low heat. The largest sticks form macaroni, while the smaller ones are known as *vermicelli* or *spaghetti*. Macaroni is manufactured in large quantities in Italy, where it is a national dish. It is also exported to Great Britain and the United States, and is manufactured to a considerable extent in France and in the United States. Macaroni has a high percentage of starch.

MACAULAY, *makaw'ly*, THOMAS BABINGTON, Lord (1800-1859), an English historian, essayist and statesman, celebrated for the brilliance of his prose style. He had a marvelous memory, and the literary and historical allusions in his writings show that in his breadth of knowledge he hardly had a rival. Macaulay was born at Rothley Temple, Leicestershire. In 1818 he entered Trinity College, Cambridge, where he obtained the Chancellor's medal for a poem on *Pompeii*, winning it a second time for a poem on *Evening*. He received a fellowship and took his M. A. degree in 1825. Before this he began to contribute to *Knight's Quarterly Magazine*, in which appeared his poems *The Spanish Armada*, *The Battle of Ivry* and *Moncontour*, and in 1825 he inaugurated his brilliant career in the *Edinburgh Review*, by his essay on *Milton*.



MACAULAY

Macaulay was elected to Parliament in 1830 and was a most vigorous and effective partisan of the reform movement. During the years from 1834 to 1838 he was in India as a member of the Supreme Council there, and on his return he was again made a member of Parliament. In 1842 he published his *Lays of Ancient Rome*, and in 1848 appeared the first two of the five volumes of his *History of England from the Accession of James II*. This brilliant rhetorical exposition, although touched with partisanship and with a tendency to paradox, has attained the position of an English classic. Its popularity when it first appeared was phenomenal, and it is said that in America its sales exceeded those of any book except the Bible. Macaulay was created a peer in 1857, and at his death he was buried in Westminster Abbey. His *History* was unfinished at his death, having been brought down only to the time of William III. Fascinating in style, this great work suffers from the partiality of its author. *The Life and Letters of Macaulay* has been published by his nephew, Sir George Otto Trevelyan.

MACAW, a genus of large parrots, found in South America. They are characterized by strong powers of flight and brilliant plumage. The tail is long and wedge-shaped, and the wings are long and pointed. The feet are strong, the cheeks naked and the bill short, strong and highly arched. The largest species, the *great scarlet*, or *red and blue macaw*, is more than three feet long. Its body is bright red, its tail is blue and crimson and its wings are greenish-blue and yellow. Its cheeks are bare, white and wrinkled, and the upper mandible of the beak is white. The *green macaw* is easily tamed, but none of the macaws can be taught to speak readily. Their notes are hoarse, and their screams are piercing; consequently, while prized for their brilliant coloring, they are annoying as pets. They feed upon fruits and seeds and are destructive to corn and other seed crops.

MACBETH (?-1057), a king of Scotland whose name is familiar to most readers through Shakespeare's famous tragedy of the same name. In 1040, in a revolt against Duncan, king of Scotland, Macbeth killed the king and seized the throne. At the death of their father the sons of Duncan had taken refuge with their uncle Siward, Earl of Northumberland, and with his aid they invaded Scotland in 1054; a battle was fought

at Dunsinane, but it was not until 1057 that Macbeth was finally defeated and slain at Lumphanan, in Aberdeen. The legends which gradually gathered round the name of Macbeth were reproduced by Holinshed in his *Chronicles of Scottish History*, which is the source of Shakespeare's tragedy.

MCBRIDE, RICHARD, Sir (1870-1917), a Canadian barrister and statesman, born in the city of New Westminster, British Columbia, and educated at the public and high schools of New Westminster and at Dalhousie University, Halifax, Nova Scotia. He was elected to the legislature of British Columbia in 1898, 1900 and 1903 and again in 1907. In 1900 he was appointed Minister of Mines in the Dunsmuir administration. He resigned the following year because of disagreement with the premier. In 1903 he became leader of the opposition in the House, and on June 1st of that year was called upon to form a Ministry, which he did, becoming Premier and Commissioner of Lands and Works. In 1907, 1910 and again in 1912 he reorganized the Ministry.

MACCABEES, *mak'a beez*, the name applied to a dynasty of Jewish priests, leaders in the movement to restore national independence. The first to come into prominence was Mattathias, who opposed the persecutions of the Syrian king Antiochus Epiphanes. With his sons and a few followers he destroyed heathen worship. When Mattathias died, 166 B. C., his sons Judas and Jonathan became successively leaders of the national movement. The last remaining member of the family was Simon, under whose rule trade and agriculture flourished. He was treacherously murdered by Ptolemy, his own son-in-law, 135 B. C. Properly, the name Maccabeus belongs only to Judas. It is supposed to mean the *hammerer*.

MACCABEES, in two Books, a part of the Apocrypha, which identifies them as of origin and authenticity so doubtful that they could not be classed as Books of Holy Writ. The Books of the Maccabees give a detailed account of the dynasty, but stop with the death of Simon. Modern scholars are inclined to ascribe a great deal of accuracy to the narration, and the Books are considered reliable source material, in most respects devoid of prejudice which marks many ancient writings. Book I was written in Hebrew; Book II, in Greek. The modern Knights of the Maccabees were named for this dynasty.

McCARTHY, JUSTIN (1830-1912), a famous Home Rule leader, was a British novelist, historian and politician, born at Cork, Ireland. He traveled for three years in the United States, and was for a short time connected with the *New York Independent*. After his return to England he held for years an editorial position on the *London Daily News*. He was prominent in Parliament and was the leader of the Home Rule party after Parnell's overthrow. His writings include *History of Our Times*, *History of the Four Georges*, *The French Revolution* and *The Story of Gladstone's Life*.

MCLELLAN, GEORGE BRINTON (1826-1885), an American general, born at Philadelphia. He was trained at West Point, served in the Mexican War and for gallant service at the battles of Contreras, Churubusco and Chapultepec was brevetted lieutenant and captain.

At the outbreak of the Civil War, in April, 1861, McClellan was appointed major-general of Ohio volunteers. A month later he was promoted to major-general in the regular army, and given command of a large area from Virginia to Illinois. By his energetic action in forcing the Confederates out of western Virginia, he made possible the organization of forty counties as a separate state loyal to the Union. In November, 1861, McClellan was made commander in chief of the armies of the United States. In this capacity he rendered valuable service in organizing the untrained recruits who poured into Washington. In the spring he led the advance toward Richmond.

After the evacuation of Yorktown by the Confederates McClellan led the Army of the Potomac in a series of engagements which terminated in the Seven Days' Battles, when he had to retire from his lines in front of Richmond. The result of this was his removal from the position of commander in chief. Afterward, when Lee advanced into Maryland, McClellan fought the battles of South Mountain and Antietam and compelled the Confederate forces to retire. The authorities at Washington were dissatisfied with his apparent slackness in following up this victory, and McClellan was relieved of his command and retired from the army. In 1864 he was nominated for the Presidency, by the Northern Democrats, but was defeated by Lincoln. In 1877 he was elected governor of New Jersey.

McCLURE, SAMUEL SIDNEY (1857-), an American editor and founder of *McClure's Magazine*, was born in Ireland. He emigrated to the United States in his youth and was graduated at Knox College in 1882. In turn he was editor of a bicycle journal, manager of the DeVinne Press in New York and founder of the McClure syndicate for the sale of newspaper articles, before he undertook his magazine venture.

McCORMACK, ma kor'mak, JOHN (1885-), one of the most popular concert tenors in the world. He was born in Athlone, Ireland, and was trained by the choir leader of Dublin Cathedral, in which church he began singing at the age of eighteen. After further study in Italy, he was favorably received in London in 1907 as a concert and opera singer, and two years later went to America under the management of Hammerstein. He subsequently became immensely popular with American audiences, in opera, concert and radio, winning especial favor for his sympathetic interpretation of Irish songs. In 1919 he became an American citizen. McCormack's principal operatic rôles include Rodolfo, in *La Bohème*; Faust; Pinkerton, in *Madame Butterfly*, and Turiddu, in *Cavalleria Rusticana*.

McCORMICK, CYRUS HALL (1809-1884), the inventor of the first practical reaping machine. He was born in Walnut Grove, Va., and as a boy worked on his father's farm. The elder McCormick tried for some time to perfect a mechanical reaper but became discouraged, and the son took up the idea where his father left off. The famous reaper that revolutionized American grain farming was completed in 1831 and subsequently improved over a course of years. In 1847 its inventor established the McCormick reaper works in Chicago; later they became a part of the International Harvester Company. McCormick used his great wealth to further education, founding the McCormick Theological Seminary in Chicago and endowing a professorship in Washington and Lee University. The McCormick reaper vastly increased grain crops, opened up new areas to farming, made the farmer much less dependent on labor and weather, and stimulated other agricultural inventions.

MACCRACKEN, HENRY MITCHELL (1840-1918), a Presbyterian clergyman and educator, born in Oxford, Ohio, and educated at Miami University and at the theological

seminaries of Xenia, Ohio, and Princeton University. After preaching in Presbyterian churches in Columbus and Toledo, he entered the educational field, and in 1891 succeeded Dr. John Hall as chancellor of the University of the City of New York. In 1910 he became chancellor emeritus. JOHN HENRY MACCRACKEN (1875-), a son, is widely known as a publicist in the educational world. Another son, HENRY NOBLE MACCRACKEN (1880-), became president of Vassar College in 1915. He is an authority on English literature and composition, and on Shakespearean drama.

McCRAE, JOHN (?-1918), a soldier, physician and poet who won lasting fame as the author of one of the greatest lyrics inspired by the World War—*In Flanders Fields*. He was a lieutenant-colonel with the Canadian forces. During the second Battle of Ypres (1915), in which the Canadian forces saved the allies from a grave disaster, John McCrae had charge of a dressing station in a hole dug in the foot of a bank. There he watched the progress of the sixteen-days' battle. Out of the agony of that time were born the following lines:

In Flanders fields the poppies blow
Between the crosses, row on row,
That mark our place; and in the sky
The larks, still bravely singing, fly
Scarce heard amid the guns below.

Take up our quarrel with the foe;
To you from failing hands we throw
The torch; be yours to hold it high.
If ye break faith with us who die
We shall not sleep, though poppies grow
In Flanders fields.

McCrae was a graduate of the University of Toronto, where he won high honors. He held the post of resident house physician at the Toronto General Hospital and at Johns Hopkins, and was subsequently pathologist to the Montreal General Hospital. For his services in the Boer War he received the Queen's Medal.

McCUTCHEON, ma kutch'en, GEORGE BARR (1866-1928), an American novelist whose books are widely popular because of their spirited action and element of adventure. He was born on a farm in Tippecanoe County, Ind., a brother of the famous cartoonist, John T. McCutcheon. He attended Purdue University, became a reporter on the *Lafayette* (Ind.) *Journal*, and was later city editor of the *Courier* of the same city. *Gravestark*, one of his earliest and best-known

stories, was published in 1901. It was followed by over a score of others, nearly all of which were very successful. They include *Brewster's Millions*, *Beverly of Graustark*, *The Rose in the Ring*, *A Fool and His Money*, *Mr. Bingle*, *The Light that Lies*, *Green Fancy*, *Shot with Crimson* (1918) and *Sherry* (1919). In 1921 he published *Quill's Window* and *West Wind Drift*.

MCCUTCHEON, JOHN TINNEY (1870-), an American cartoonist and special newspaper correspondent, was born in Tippecanoe County, Ind. He was educated at Purdue University, where he studied art. As correspondent for the *Chicago Record* his cartoons attracted public notice in 1896. He made extensive trips in Asia, in the Philippines in 1898, and in South Africa during the Boer war. In 1903 he became the cartoonist for the *Chicago Tribune*. He organized and was first president of a great outdoor zoo near Chicago, at Brookfield.

MACDONALD, JAMES RAMSAY (1866-), was born in Lossiemouth, Scotland. Early espousing the cause of labor, he was returned to Parliament in 1906, and became the strong arm and leader of the Labor Party. On the fall of the Baldwin Government in 1924, he became Prime Minister, but held office only a few months in that year. In June, 1929, the general elections returned his Party to power and he was again made Prime Minister. He visited Washington and discussed with President Hoover problems of peace and naval reduction. The London naval treaty was ratified, troops were withdrawn from the Rhine, and MacDonald acted as chairman of an Indian Round Table conference. In 1931 the Labor Cabinet fell, and a national non-party Cabinet with MacDonald as Prime Minister was formed. A general election following the dropping of the gold standard resulted in the return of the Conservative party to power, but MacDonald was again made Prime Minister with Conservative support. In 1932 and 1933 MacDonald's efforts were mainly directed to securing sound foundations for peace with other nations. In June, 1933, he acted as chairman of the World Economic Conference in London.

MACDONALD, JOHN ALEXANDER, Sir (1815-1891), first Premier of the Dominion of Canada, was born in Glasgow, Scotland. His family came to Canada in 1820 and settled in Kingston, Ont., where he became

a lawyer. In 1844 he was elected to the assembly as Conservative member for Kingston.

His abilities attracted attention and he became receiver-general and then commissioner of crown lands. He was in opposition until 1854, but he gradually became the real leader of the Liberal-Conservatives. In the Ministry of Sir Etienne Taché he was Attorney-General, and on Taché's retirement in 1858 he became Premier. In 1864 delegates from Ontario, Quebec and the Maritime provinces met at Charlottetown, and the outline of union as there agreed upon was worked out at the Quebec conference in the next year. The actual framing of the British North America Act, the result of these conferences, was carried out in London during December, 1866, and January, 1867, by delegates from the provinces in coöperation with law officers for the Crown. As the leader in the preliminary discussions Macdonald naturally became the first Premier of the Dominion in 1867.

Organizer of the Dominion. The difficulties of organizing the Dominion called for infinite tact and resource on the part of the new Premier. The jealousies of the provinces had to be smoothed over, yet the federal rights had to be maintained. The Northwest Territories were secured by purchase of the Hudson's Bay Company's territorial rights, and Manitoba was organized as a province. The Pacific scandals of 1874, in connection with the building of a transcontinental railroad, forced the Macdonald Ministry to resign, but in 1878 the Liberals were swept out of office and Macdonald again undertook the building of the railroad. "The faith of Sir John," says one of his biographers, "did more to build the road than the money of Mount-Stephen." During the remaining years of his life the history of Sir John is practically the history of Canada. Most of his efforts were directed to the organization and development of the great Northwest, one of his greatest reforms being the formation of the Royal Northwest Mounted Police. Until his death he retained the office of Premier. The excitement and anxiety of the contested election of 1891 brought on a stroke of paralysis, which caused his death.

The career of Sir John Macdonald cannot be studied apart from the history of Canada. He was a man of strong will and great ambition; but his foresight and political sagacity enabled him to submit to the leader-

ship of smaller men without impatience. "He had the gift of living for the work in hand without feeling the distraction of other interests." Few political leaders have had so many opposing elements to reconcile, so many factions to hold together.

MACDOWELL, EDWARD ALEXANDER (1861-1908), one of the most original of America's composers, was born in New York. He studied music in Paris, Wiesbaden and Frankfort, and became well known as a teacher, pianist and composer before his return to the United States in 1888. His works and his playing became very popular in his own country, and before his death he was generally recognized as probably the foremost American composer. From 1896 to 1904 he was head of the department of music at Columbia University, but overwork told on him, and in the year following his resignation his mind failed. A characteristic of MacDowell's work is his introduction of touches of American folk-music, notably Indian. He composed an *Indian Suite* for the orchestra, and his very popular *Woodland Sketches* for the piano make use of Indian themes. In all, he published about sixty works, which include almost 300 separate pieces.

MACE, *mase*, an East Indian spice, the dried covering of the seed of the nutmeg. This covering is a fleshy, netlike envelope, somewhat resembling the husk of a filbert. When fresh it is of a beautiful crimson hue. It is extremely fragrant and aromatic and is chiefly used in cooking or pickling. See NUTMEG.

MACE, originally, a weapon of offense, consisting of a club or staff with a heavy metal head. Later the mace came to be a symbol of office, and was borne before officials; and to-day it is in use chiefly as an emblem of authority in legislative bodies. The maces used in the House of Representatives in the United States and in the houses of the Parliament of Great Britain are very elaborately wrought and richly ornamented, and about three feet in length. When carried down the aisles by the sergeant-at-arms the mace commands silence and decorum.

MACEDONIA, *mas e do'ni ah*, a region in the Balkan Peninsula which in ancient times was the seat of a great empire. Politically speaking, there is no Macedonia to-day, but the name is still applied to the district. It extends west and south of the Rhodope

Mountains, a chain in Southern Bulgaria, and its southeastern portion borders on the Aegean Sea. In 1913, at the close of the second Balkan War, Macedonia was divided among Greece, Serbia and Bulgaria. The region was the scene of considerable fighting during the World War. In September, 1918, allied victories on the Macedonian front prepared the way for the invasion of Bulgaria and Serbia and the subsequent surrender of Bulgaria.

It is thought probable by most historians that the ancient Macedonians were a Greek tribe which remained behind when other tribes migrated into Greece, but the customs and language became modified so that the Macedonians were a distinct people. The country did not become powerful until the accession of Philip II to the throne in 359 B. C. Under him Macedonia became leader of the Greek states and under Alexander the Great the kingdom expanded into an empire. After the death of Alexander the Macedonian Empire was divided among his generals, the chief divisions being Macedonia, Egypt, Syria, Pergamos, Bithynia, Rhodes and the Greek states. In 146 B. C. Macedonia was made a Roman province, and in A. D. 395, when the Roman Empire was divided, it became a part of the Byzantine Empire. At the fall of the Byzantine Empire it came into the power of the Turks, who held it until the close of the Balkan wars.

Related Articles. Consult the following titles for additional information:
 Alexander the Great Greece, subhead
 Balkan Wars History
 Demosthenes Philip II of Macedon
 World War

McGEE, THOMAS D'ARCY (1825-1868), a Canadian poet, orator and statesman, was born in Louth, Ireland. He emigrated to the United States in 1842 and in three years made an international reputation as a poet and editor on the staff of the *Boston Pilot*. Daniel O'Connell induced him to return to Ireland as editor of the *Freeman's Journal* when he was only twenty years of age. McGee became associated with the "Young Ireland" party and was forced to escape to the United States in 1848. He became one of the editors of the *New York Nation* and the *Celt*, which was first published in Boston and afterward in Buffalo.

In 1857 he removed to Montreal and started the *New Era*. Here he became widely known as an orator, entered Parliament and

became president of the council. He afterward held cabinet offices as Secretary of State and Minister of Agriculture, and in 1867 was elected to the Dominion Parliament. In 1868 he was assassinated by a Fenian. His published works are *History of the Irish Settlers in America*, *History of Attempts to Establish the Protestant Reformation in Ireland* and *Popular History of Ireland*.

MCGILL COLLEGE AND UNIVERSITY, a co-educational institution, established at Montreal, Canada, in 1821, by the bequest of Hon. James McGill. To the original departments of arts and medicine there have been added departments of law, applied science, agriculture, music and dentistry, and the graduate school. Women are admitted to all courses except those in applied science. Incorporated with the university are the Royal Victoria College, and Macdonald College.

There are also four divinity schools affiliated with the university. McGill is affiliated with the universities of Oxford, Cambridge and Dublin, and it has a number of affiliated schools and colleges in the Dominion. Its government is similar to that of English universities. The supreme authority rests in the governor-general of the Dominion. The executive officer is styled principal and is *ex officio* vice-chancellor. The chancellor is the president of the board of governors, and is usually a non-resident officer.

The library contains 275,000 volumes, and the annual income is about \$1,000,000. There are more than 450 faculty members and nearly 3,000 students.

MACHIAVELLI, *mah kyah vel'le*, NICOLÒ (1469-1527), a distinguished Italian statesman and historian, born at Florence. From his name was derived the term *Machiavellian*, which means about the same as "unscrupulous use of power." Machiavelli was not a scoundrel, but he wrote a book, *The Prince*, in which he advocated the creation of a united Italy through the leadership of a prince who would stop at nothing to attain his ends. This theory stamped the man with a reputation time has never effaced.



MACHIAVELLI

Machiavelli for more than fourteen years guided the destinies of the Florentine Republic, undertook embassies, concluded treaties and jealously guarded the rights and liberties of his native city. When the Medici returned to power in 1512, by the aid of the Pope, Machiavelli was deprived of his office and retired to his country house. Here he devoted himself to literary labor, the chief results of which are found in his *History of Florence*, *Discourses upon the Ten First Books of Livy*, *The Prince* and the comedies of *La Mandragola* and *La Clizia*.

MACHINE, *ma sheen'*, any device that will perform work, whether it be simple or extremely complex. The nut-cracker is a machine as truly as is a 400-ton locomotive.

The invention of machines which perform perfectly the most difficult operations has marked the present era in history as the age of machinery. The nations which are the most intelligent are those whose people lead in the development of labor-saving devices. At the top of the list of progressive countries, judged by this standard, are the United States and Great Britain and its enlightened overseas possessions.

The dawn of the age of machinery may be said to date from the day James Watt improved the steam engine and made it practicable. Electrical power to-day is supplanting steam at a rapid rate, and for this giant stride ahead the world owes an enormous debt to Thomas A. Edison. Without detracting from the honor due a great number of celebrated men whose work has enriched the world, it may be declared that the two men named have contributed most towards revolutionizing the social and business life of all peoples. See INDUSTRIAL REVOLUTION.

Machines have entirely changed the processes of industry. Less than a hundred years ago one man made by hand all parts of a shoe; to-day one person operates a machine which produces only a single part, and he knows nothing of the numerous other processes by which the article is completed. From the small one-man shoe shop the industry has become one in which thousands of persons work in great factories amid the noise of hundreds of intricate machines. This is also the story of weaving, the power loom having relieved the housewife of a heavy burden. Her spindle and distaff have been supplanted by the modern spindle which can be run at the rate of 11,000 revolutions a minute.

Labor did not view with complacency the steady encroachment of machinery. The early inventors were bitterly assailed. The home weavers in England smashed the first spinning jenny, for it promised to destroy their occupations, and for a time their fears were realized. No opposition could long stay the progress of industry, however, and labor found it possible by a readjustment of views to prosper more than ever before. An entirely new condition has always brought temporary hardship, for immediate adjustment of the problems of labor is not possible.

MACHINE GUN, a name given to any of those pieces of ordnance that are loaded and fired mechanically. They have usually a number of separate barrels. As the range is limited, machine guns can never take the place of cannon and rifle, however deadly the guns may be at short range.

The first machine gun to come into prominence was the French *mitrailleuse*, which was employed in the Franco-German War. The Gatling gun first appeared in the United States and was speedily adopted with modifications by Great Britain and other powers. Other guns of this kind were the Hotchkiss, the Nordenfeldt and the Gardner. A more recent invention is the Maxim, which, after the first shot, continues to fire time after time by means of the power derived from the explosion of each successive cartridge.

The Browning Gun. In 1917, after severe tests, the United States adopted the Browning machine gun for use in the World War. The Browning is of two types; one is light, and can be fired from the shoulder, for it weighs but fifteen pounds; the other, weighing thirty-five pounds, rests upon a tripod. It is a water-cooled, gas-operated gun, and its cartridges will fit the Springfield and Enfield rifles, and thus are interchangeable. It will shoot over 400 shots a minute.

The principle of gas operation is simple. The gun is cocked with an easily operated handle for the first shot. The bullet is expelled by gases, which exert a maximum pressure of 50,000 pounds to the square inch. A small portion of this powder gas is taken off by the gun mechanism to act as power to operate the gun automatically. A bullet discharged from this gun has approximately the same energy as that fired from the United States rifle, model 1917, or from the Springfield service rifle. Cartridges are fed from a detachable magazine.

The gun may be operated as an automatic or as a semi-automatic arm by the manipulation of a conveniently located lever. By putting the lever in the first position, the gun is made to fire single shots by trigger release; by putting the lever in the second position the gun becomes an automatic and will fire twenty shots in from two and a half to three seconds; a third lever position is a locking device.

MACKAY, *m'kay'*, the family name of two influential American capitalists, father and son.

John William Mackay (1831-1902) was born in Dublin, Ireland. He moved to New York in childhood, in 1851 went to California and in the following year to Nevada, where, in 1872, he was one of the discoverers of the Bonanza mines, of which he owned two-fifths. In 1884, with James Gordon Bennett, he founded the Commercial Cable Company and Postal Telegraph Company and precipitated a long fight with the Western Union. Later he headed the company which constructed and laid two Atlantic cables. He died in London.

Clarence Hungerford Mackay (1874-), son of the above, succeeded to his father's holdings in various enterprises, becoming president of the Postal Telegraph-Cable Company. Mackay is man of many interests, having served as vice-president of the New Theatre, director of the Metropolitan Opera Company, and treasurer of the Lincoln Farm Association, which raised funds to preserve Lincoln's birthplace. He is also interested in racing, yachting, hunting and tennis.

McKEESPORT, PA., a city in Allegheny County, fifteen miles southeast of Pittsburgh, at the confluence of the Monongahela and the Youghiogheny rivers, and on the Pittsburgh & Lake Erie, the Baltimore & Ohio and the Pennsylvania railroads. It is in a region having deposits of bituminous coal and natural gas, and it has a vast iron and steel industry. The National Tube Works has a very large plant here. There are also manufactures of tin plate, iron and steel sheets, radiators, boilers, acetylene gas, tool steel and castings. The city contains a hospital, a Carnegie Library, a Y. M. C. A. building, two business colleges, a Masonic Temple and a total of nine parks covering 156 acres. The place was settled in 1795, and was incorporated as a borough in 1842 and as a city

in 1890. The city is governed on the mayor-council plan. Population, 1920, 45,975; in 1930, 54,632.

MACKEN'ZIE, formerly a separate district and territory of Canada, now a part of the North West Territories. It was bounded on the north by the Arctic Ocean; on the east by Keewatin; on the south by Manitoba, Saskatchewan, Alberta and British Columbia, and on the west by Yukon. Its area was over 500,000 square miles, and the population was 5,216. It contained a large number of lakes, chief among which are Great Bear Lake, Great Slave Lake and Aylmer Lake.

MACKENZIE, ALEXANDER (1822-1892), a Canadian statesman, born in Perthshire, Scotland. Originally a stone mason, he emigrated to Kingston, Canada, in 1842 and began business as a builder and contractor. In 1852 he was made editor of a Liberal newspaper, and he entered the Ontario parliament in 1861 and the Dominion parliament in 1867. He soon became leader of the Liberal party, and on the resignation of Sir John Macdonald in 1873, he became premier and retained office with great success till 1878. He remained in parliament until his death, heading the opposition for a time, and he many times refused the honor of knighthood. (See illustration, *A Group of Premiers*, in article CANADA.)

MACKENZIE, ALEXANDER, Sir (1755-1820), a Canadian explorer, born at Inverness, Scotland. He emigrated to Canada in 1775 and in the employ of the Northwest Fur Company he explored the great river named after him, from the western end of Great Slave Lake to the Arctic Ocean (1789). He made another expedition to the western coast (1792) and was the first white man to cross the Rocky Mountains.

MACKENZIE, WILLIAM, Sir (1849-1923), a Canadian railroad man, was born at Kirkfield, Ont. He began life as a school teacher, but later became a storekeeper. He soon went west and became a contractor on the Canadian Pacific Railway. His association with Sir Donald Mann began in 1886; since that date the firm of Mackenzie, Mann & Co. has built many important lines, including the Calgary & Edmonton Railway and the Qu'Appelle, Long Lake & Saskatchewan Railway. In 1896 they commenced building on their own account, with 100 miles of the Lake Manitoba Railway & Canal Company. This was the beginning of the Canadian

Northern, a system which now includes over 5,500 miles. Sir William financed all the Canadian Northern lines, which became part of the Canadian National Railway System. He was president of the Canadian Northern and of many other public service corporations. He was also greatly interested in, and controlled transportation lines in Cuba, Mexico and Brazil.

MACKENZIE, WILLIAM LYON (1795-1861), a Canadian politician and statesman, specially noted as leader of the rebellion of 1837-1838. He was born in Scotland, but at the age of twenty-five came to Upper Canada and settled at York, now Toronto. Four years later he established the *Colonial Advocate*, a paper in which he attacked the government and criticized many of its measures. He was elected to the legislature of Upper Canada in 1828, and was reelected three successive times, but was refused a seat because of an alleged libel on the ministry. In 1832 he visited England as a delegate to secure reforms in government and the redress of certain grievances. He was successful in his mission, and on his return he was chosen the first mayor of Toronto and was again elected to the legislature.

During these years Mackenzie used his position and opportunity to create a strong sentiment against the existing government, and he publicly declared his sympathy with the inhabitants of Lower Canada (Province of Quebec), who were even more open in their opposition to the existing conditions than were the inhabitants of Upper Canada. In 1837 he led a movement to establish a new government and overthrow the existing order. He and his followers were defeated by a detachment of Canadian troops, and Mackenzie fled to the United States, where he established headquarters on Navy Island in the Niagara River and attempted to gather about him a following to invade Canada. Prompt action on the part of the United States authorities, however, prevented the success of his project, and he went to New York, where he remained several years. He returned to Canada after the proclamation of amnesty in 1849, and from 1851 to 1858 he served in Parliament. See CANADA, subhead *History*.

MACKENZIE RIVER, next to the Mississippi, the largest river in North America. It flows out of Great Slave Lake, first west, then north, finally northwest, and after a course of about 1,000 miles it falls into the

Arctic Ocean by numerous mouths. Its principal affluents, including the feeders of Great Slave Lake, are the Athabasca, the Great Slave River, the Liard and the Peel, and it is navigable throughout its course. It was discovered by Alexander Mackenzie in 1789.

MACKEREL, one of the important food fishes, which inhabits almost the whole of the European seas and is found in tropical and temperate zones in other parts of the world. There are several species, but the common mackerel is the most important as a food fish. When full-grown it is from ten to eighteen inches long, and large specimens attain a weight of about three pounds. The mackerel is variegated blue and green above, with wavy black lines, and below is silvery white. The term *mackerel sky* has reference to the wavy stripes on the back of the fish, a mackerel sky being one in which the clouds suggest wavy parallel lines. In the United



MACKEREL

States the center of the mackerel industry is at Gloucester, Mass., whence mackerel fleets fish all along the coast. The greater part of the product is salted.

MACKINAC, *mak'in ack*, ISLAND, an island and city in Mackinac County, Mich., 260 miles northwest of Detroit, in the Straits of Mackinac, at the northwestern extremity of Lake Huron. The island is about two miles wide and three miles long and is a state park. Its southern end rises abruptly from the lake, and the bluff is the site of the old Fort Mackinac, which was an important military post previous to and during the War of 1812, but has long since been vacant. The town of Mackinac is at the foot of the bluff along the south shore of the island, and is a noted summer resort, during the height of the season having from 8,000 to 10,000 visitors. The city contains a number of large hotels erected for the pleasure and convenience of summer visitors. The permanent population is about 675.

McKINLEY, MOUNT, the highest peak of North America, situated in the south-central part of Alaska. Its height is 20,300 feet, and it is covered with snow and has extensive

glaciers. Mount McKinley was ascended on June 7, 1913, by Archdeacon Hudson Stuck and three companions.



Tomb in Canton

McKINLEY, WILLIAM (1843-1901), an American soldier and statesman, twenty-fifth President of the United States. Though a man of quiet manners and unemotional temperament, he made a deep impression on the minds of the American people, partly because he led them out of their traditional isolation in world politics, and partly because he died at the height of his career, the victim of an assassin. His administration marked a turning of the ways in American political history. A new issue of "imperialism" was created by the acquisition of the Spanish colonies, and a new note was struck in regard to the trusts and the time-honored Republican policy of protection. McKinley pointed the way to reform just before his death, leaving to his successors the task of formulating new policies in respect to the tariff and the regulation of "big" business.

Early Life. McKinley was born on January 29, 1843, at Niles, Ohio. His first ancestor in America was a Scotch-Irishman who settled in Pennsylvania in 1743 and later fought in the Revolution. The grandfather of the future President, settling in Ohio in 1829, prospered in the iron industry, and both McKinley and his father worked in an iron foundry in boyhood. William received his early education in Ohio at the Poland Seminary. In 1860, at the age of seventeen, he entered Allegheny College, Meadville, Pa., but ill health compelled him to discontinue his studies the first year. After teaching school for a short period, he enlisted, in June, 1861, in the Twenty-third Ohio Infantry, under command of Colonel (subsequently General) W. S. Rosecrans, and served through the war, gaining the rank of brevet major for gallantry at Antietam, Opequon Creek and Cedar Creek. He returned to Poland at the close of the war, began the study of law and was admitted to the bar in 1867.

Early Political Career. Entering on the practice of law in Canton, Ohio, Major McKinley soon became interested in politics.

Administration of William McKinley, 1897-1901

I THE PRESIDENT

- (1) Birth
- (2) Parentage
- (3) Education
- (4) Military career
- (5) Public life
- (6) Character
- (7) Death

to be limited
(d) When necessary
U. S. troops to
maintain the
government

- (b) Hawaii
 - (1) Annexed to U. S. 1898
 - (2) Organized as a territory, 1900

II. GOVERNMENTAL AFFAIRS

- (1) Domestic
 - (a) Dingley Tariff
 - (b) Gold Standard Act, 1900
 - (c) Reorganization of the army
- (2) Foreign
 - (a) New postal treaty
 - (b) Spanish-American War
 - (1) Causes
 - (2) Principal events
 - (3) Results
 - (a) Porto Rico, Guam, Philippines ceded to U. S.
 - (b) U. S. paid \$20,000,000 to Spain
 - (c) U. S. a colonial nation
 - (c) Attempted annexation of Danish West Indies
 - (d) Dispute over Alaska-Canadian boundary
 - (1) Joint High Commission
 - (2) Treaty of 1903 providing for new commission
 - (e) Relations with China
 - (1) "Open door question"
 - (1) "Open door question"
 - (2) Boxer insurrections, 1900
- (3) Colonial relations
 - (a) Cuba
 - (1) Protectorate under military law
 - (2) The Cuban Republic
 - (a) No foreign power to secure control
 - (b) U. S. to have coal-
ing station
 - (c) Debt contracting
power of Cuba

- (c) Samoa
 - (1) Joint protectorate abolished
 - (2) Tutuila and other islands under United States sovereignty
- (d) Philippine Islands
 - (1) Insurrection of Aguinaldo
 - (2) Military government
 - (3) Civil government

III. LOCAL AND INTERNAL AFFAIRS

- (1) Pan-American Exposition
- (2) Discovery of gold in Alaska
- (3) Wireless telegraphy in practical use
- (4) Dedication of Grant's tomb
- (5) Galveston destroyed by flood

Questions on McKinley

Give a short account of the career of William McKinley before he became President.

What was the Dingley Tariff? What did the law accomplish?

What were the main features of the Gold Standard Act of 1900?

What were the causes of the Spanish-American War?

What were the principal battles of the war?

What were the terms of the treaty of peace?

How was the dispute regarding the Alaska-Canadian boundary settled?

Why did the U. S. and other governments interfere in the affairs of China? With what result?

Who was Aguinaldo?

Where was the Pan-American Exposition held?

What great tragedy took place there?

McKinley's Administration

1897

1901

WAR WITH SPAIN
- 1898 -

WRECK OF
THE MAINE



SPANISH BICENTENNIAL

A PHILIPPINE
TREE HOUSE

CONQUEST OF THE
PHILIPPINES
- 1899

PAN-AMERICAN EXPOSITION
AT BUFFALO
1901

ASSASSINATION OF
McKINLEY - 1901



CENSUS
OF 1900
POPULATION
76,000,000

DEDICATION
OF
GRAND TOMB
1897

PROCESS OF
LIGUATING AND
DISCUSSING
1897

WARRIOR
AGAINST SPAIN
APR. 23, 1898

TREATY
OF PEACE
DEC. 10, 1898

HAWAII
ANNEXED
1898

TRUCKS IN THE
SOUTHERN
1899

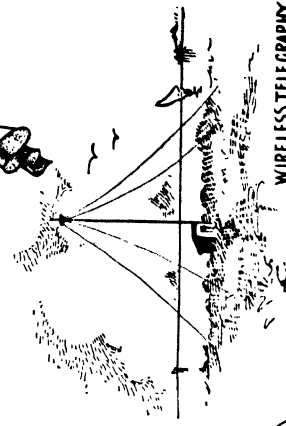
CHICAGO
1893 BASEL
OPENED 1900

1900
PEOPLE OF US
SHOW GREAT
SYMPATHY
FOR BOER

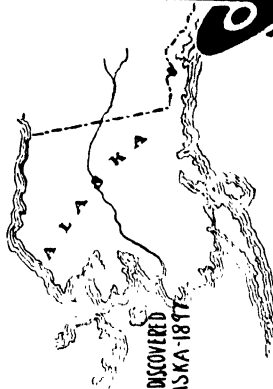
CHINESE
DIFFICULTY
(THE BOERS)
1900

CONQUERED
IN THE CANADA
AND CANADA
SETTLED
1900

GALVESTON
FLOOD
1900



WIRELESS TELEGRAPHY
- 1897 -



GOLD DISCOVERED
IN ALASKA - 1897

He was elected prosecuting attorney in 1869, made successful speeches in support of Grant for President and of Hayes for governor of Ohio, and in 1876 was elected to Congress as a Republican, serving continuously until 1891, except for one term. Though defeated in the Democratic landslide of 1890, he had become known throughout the nation as an advocate of the protective tariff, and in his last term in Congress, as chairman of the Ways and Means Committee, he had helped draft the McKinley Tariff Bill. He had also been one of the prominent figures in the national conventions of the Republican party, serving on the platform committee on two occasions. In 1891 McKinley was elected governor of Ohio, and was reëlected in 1893. His administrations as governor, though severely criticised for close relations with corporations and for exceptional regard for party advantage, were so efficient, in general, that McKinley became a popular party leader throughout the nation.

As President. In June, 1896, he was nominated by the Republican national convention at Saint Louis for President, and was elected by a vote of 271 in the electoral college to 176 for William J. Bryan, his Democratic opponent. In the Presidential canvass, men of both parties rallied to his support in opposition to the free silver movement represented by Bryan. His administration was notable for maintenance of a policy of expansion, both territorial and commercial, the former being emphasized by the Spanish-American War, the annexation of the Philippines and the annexation of Hawaii, the latter by the negotiation of reciprocity treaties. The Dingley tariff law was also passed in 1897, and a bill establishing the gold standard became a law two years later.

McKinley was reëlected in 1900 with increased majorities, receiving 292 of the 477 electoral votes. He had won a place in the hearts of many of his supporters as one of the most beloved of American statesmen; his second term had had an auspicious beginning, and his foreign and domestic policies were received with favor. On September 6, 1901, while holding a public reception at the Pan-American Exposition at Buffalo, he was shot and fatally wounded by Leon Czolgosz, an anarchist. He died September 14 and was buried at Canton, Ohio, September 19. For five minutes at the hour of his interment, all business ceased throughout the land, and re-

markable evidences of respect and affection were manifested by the peoples of other countries. As a statesman, McKinley was influenced, perhaps exceptionally, by the sentiment of his constituents, and it was rather his foresight in determining their views, than his own convictions, that made him a popular leader. However, because of his sincerity, his purity of character, his devotion to high ideals, his generosity and his tact, he won general admiration and esteem.

Related Articles. Consult the following titles for additional information:

Aguinaldo	Porto Rico
Cuba	Spanish-American
Pan-American	War
Exposition	Tariff
Philippine Islands	Trusts

MACLAREN, *m'klair'en*, IAN. See WATSON, JOHN.

MacMAHON, *mak ma ohN'*, MARIE EDMÉ PATRICE MAURICE DE, Duke of Magenta (1808-1893), a marshal of France, educated at the military college of Saint Cyr. He distinguished himself during the Crimean War and during the war with Austria in 1859, having much to do with the defeat of Austria at Magenta and Solferino. In the war between France and Germany in 1870, MacMahon was shut up in the town of Sedan by the German armies and was wounded in the battle before his surrender. After the war he assisted in putting down the Commune, and in 1873 he was elected President of the French republic, a position which he occupied until 1879.

McMASTER, JOHN BACH (1852-1932), a present day American historian was born in Brooklyn. He was graduated from the College of the City of New York and soon became known as a writer on engineering subjects. He was instructor of civil engineering in Princeton; but, after six years, resigned to devote his whole time to the study of history and was later elected professor of American history in the University of Pennsylvania. He published a number of books of history and biography, but his most important contribution to the science is a *History of the People of the United States*, a work in seven volumes, covering the period from the Revolution to the Civil War.

McMONNIES, *mak mun'iz*, FREDERICK (1863-), an American sculptor, born in Brooklyn. He studied at first under Saint Gaudens and in 1884 went to Paris. His first work, a statue of Diana, was exhibited in France in 1889 and was accorded honor-

able mention. His best known works are the *McMonnies Fountain*, at the World's Columbian Exposition in Chicago, in 1893, admired by millions of people; *Sir Harry Vane*, in the Boston Public Library, and *Shakespeare*, in the Congressional Library at Washington. After 1900 McMonnies devoted his time to painting.

MACON, *ma'kon*, GA., the county seat of Bibb County, 100 miles southeast of Atlanta, on the Ocmulgee River and on the Central of Georgia, the Southern, the Georgia, the Georgia Southern & Florida, and the Macon, Dublin & Savannah railroads. There are two airports. It is the fourth inland cotton market in the country and ships large quantities of fruits, vegetables and other produce. The manufacture of cotton products is the most important industry. There are also railroad shops, lumber mills, foundries and manufactures of clay products, boats, furniture and other articles. The important educational institutions are Mercer University, Mount de Sales Academy, the state academy for the blind, and Wesleyan College, one of the oldest colleges for women in the United States. There is a fine Y. M. C. A. building, and the city has a large municipal auditorium. The place was settled in 1822 and was chartered as a city in 1832. Population, 1920, 52,995; in 1930, (municipality) 64,045. There is a large colored population.

MADAGASCAR, a large island in the Indian Ocean, and a dependency of France. It is 240 miles from the southeastern coast of Africa, from which it is separated by the Mozambique Channel. With an area of 241,094 square miles, Madagascar is the fifth largest island in the world. In 1931 it had an estimated population of 3,701,770, of whom 14,150 were French and 2,340 were of other European birth. The native inhabitants, called Malagasy, belong to Malayo-Polynesian stock and speak a Malayan language. The Hovas are the most important tribe, and the other chief tribes are the Betsimisarakas, the Betsileo, the Tanalaks and the Sakalavas.

In the coast districts the houses of the better class are built of framed timber and have high roofs; the dwellings of the lower classes are constructed of bamboo or rushes, or even of clay. The Malagasy show much aptitude as silversmiths, gunsmiths and carpenters, and with rude looms they make handsome cloths. The native religion of the

great bulk of the people is a kind of fetishism, or worship of charms. Many of their superstitious customs have been abolished, and Christianity has been adopted, chiefly by the Hovas. The government is administered by a French governor-general and a council. The capital is Antananarivo (which see). Education is compulsory between the ages of eight and fourteen, and children are required to learn the French language.

Agriculture and cattle breeding are the chief occupations of the people. Natives have under cultivation over 3,000,000 acres, and the chief products are rice, sugar, coffee, manioc, cotton, cacao, vanilla, tobacco, beans and cloves. Butter is made, and the cultivation of the silkworm is encouraged. There are dense forests, and trees furnishing rubber, bamboo and rosewood are numerous. Plants producing gums, resins, textile fibers, dyestuffs and medicines are also abundant. Tamatave, the principal port, is visited regularly by steamers. The bulk of the trade is with France. The island has good postal and telegraph service, and a railway is in operation between the capital and Tamatave. There are a number of automobile and wagon roads in use, and additional railway construction is under way or being planned.

History. Madagascar was known to Marco Polo at the end of the thirteenth century, and in 1506 it was visited by the Portuguese, who gave it the name of Saint Lorenzo. In the latter part of the seventeenth century and during the most of the eighteenth century, the French had the ascendancy in the island, but the English gained the supreme influence early in the nineteenth century. In the year 1810 Radama I became king of the Hovas, and with his approval Christian missionaries began to teach in the capital in 1820. Many converts were made, the Bible was translated into the Malagasy tongue, the language was reduced to a systematic written form and printing was introduced. In 1828 Radama was succeeded by his chief wife, Ranavalona I, a woman of cruel disposition, who persecuted the Christians and closed the island to Europeans.

She was succeeded in 1861 by her son, Radama II, who reopened the island to the missionaries and emancipated the African slaves. He also granted extensive territories and privileges to France, an act which offended his chiefs and led to his assassination in 1863. His wife occupied the throne five

years, and she was succeeded by Ranavalona II, who became queen in 1868. Under her, Christianity became the state religion. The government, jealous of foreign influence in the island, invaded French territory in 1883, and the result was a struggle which lasted for two years. By a treaty in 1885, Madagascar was virtually placed under French protection, and eleven years later it was declared a colony of France. In 1897, France emancipated the slaves of the Hovas and in the same year was obliged to put down a serious rebellion. During the World War France found the island a valuable source of foodstuffs.

MAD'DER, a genus of plants native in almost all tropical regions. From the roots of a species which is grown extensively in Holland is obtained a beautiful red coloring matter, which in one shade is known as *turkey red*. The chief coloring matter in the different madder dyes is called alizarin (which see). *Common madder* is a native of Southern Europe and Asia, though cultivated in most European countries. It has black fruit and small, greenish-yellow flowers. Cinchona trees and coffee trees are members of this family, and in the United States the common bluets and button-bush are representatives. The madder family has about 6,000 species.

MADEIRA, *ma dé'rah*, a Portuguese island in the North Atlantic, about 400 miles from the coast of Morocco. It is the largest of the group of Madeira Islands. Its length is about thirty-eight miles, its breadth, twelve miles, and its area, 315 square miles. The island is traversed by a central mountain ridge, the highest point of which is over 6,000 feet above the sea. The chief product of Maderia is wine, for which it has long been famous. The yearly exports of this product amount to about 700,000 gallons. The climate is equable, and the island is considered an excellent health resort. The capital and chief center of trade is Funchal. Madeira was colonized by the Portuguese in the early half of the fifteenth century. Its inhabitants are of mixed negro, Moorish and Portuguese descent. Population, 1935, 211,300.

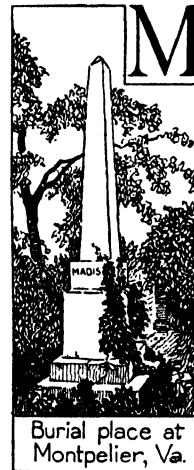
MADEIRA RIVER, a large river of South America, the largest tributary of the Amazon. It is formed by the union of the Beni, the Mamoré and the Guaporé, on the frontiers of Brazil and Bolivia. With the Mamoré its length is about 2,000 miles, and it is navigable for almost half of this distance. East of

the Bolivian frontier the navigation is interrupted by cataracts, but beyond the cataracts it is again navigable. The chief tributary of the Madeira, the Rio Teodoro, was discovered in 1914 by Theodore Roosevelt.

MADERO, *ma dair'oh*, FRANCISCO (1873-1913), a Mexican soldier and politician, leader of the revolution which deposed Diaz. He was born in Coahuila, where in later years he supervised the estate of his grandfather, a wealthy landowner. Here he introduced modern methods of agriculture, and generally showed himself an able though occasionally impracticable idealist. In 1900 he moved to Mexico City, where he immediately became a prominent opponent of President Diaz and his policies. In 1910 appeared his book *The Presidential Succession of 1910*, a statement of proposed reforms, and Madero himself became a candidate for the Presidency. He was kept in jail a short time before the election. On his release he instituted the revolution which resulted in the resignation and voluntary exile of Diaz in May, 1911, and in November he himself became President.

Though devoted to justice and civic righteousness, Madero lacked the strength of character to control the situation. A number of opposing elements finally forced his resignation on February 14, 1913, and on February 22 he was killed. It seems certain that he was executed with the consent, and probably by the orders, of General Huerta.

Related Articles. Consult the following titles for additional information:
Diaz, Porfirio Huerta Mexico



MADISON, JAMES (1751-1836), an American statesman who was prominent in the political affairs of his country from the outbreak of the Revolution to the period following the War of 1812. He was the fourth President of the United States, the successor of Thomas Jefferson, under whom he had served as Secretary of State during both terms. It is for the part he took in the drafting and ratification of the Constitution, rather than for his career as President, that Madison is chiefly honored to-day. He had the misfortune to direct a war that brought little glory to the

nation, and which he had neither welcomed nor prepared for, and he was greater as a constructive thinker than as a practical executive. Because of this he has lost prestige as a President, but as the "Father of the Constitution" he has earned the eternal gratitude of the country.

Birth and Education. Madison was born at Port Conway, Va., on March 16, 1751. He was a descendant of one John Madison, who took out a patent for land on Chesapeake Bay in 1653. The succeeding Madisons, including the boy's father, were all in comfortable financial circumstances, and James was well educated. In 1771 he was graduated at Princeton College, and after a year of post-graduate work, he returned home to take up the study of history and constitutional law. Though barely twenty-one, he realized the need of strong men in public affairs, for critical days were plainly in store for the colonies. Certain it is, his knowledge of law and government proved to be of inestimable value in the making of the nation.

Early Political Career. Madison served in minor local public offices until 1776, when he was a member of the Virginia constitutional convention. There he vigorously advocated the granting of absolute religious freedom and thus displayed for the first time his natural democratic inclinations. In this service he was closely in touch with Jefferson, who was later to write that great document on the rights of man—the Declaration of Independence. Madison became a member of the first state assembly, but was defeated at the end of the term because, it was said, he refused to make the usual political gestures, such as treating for votes. In 1780 he was elected to the Continental Congress, where he was an outstanding member in the debates.

Returning to Virginia in 1784, Madison was again elected to the assembly. He had become convinced of the need for a stronger union of the states than was provided by the Articles of Confederation, and in 1786 assisted in drafting the Virginia resolution calling for a convention to consider ways and means of advancing the nation's commercial interests. The Annapolis Convention, assembled for that purpose, led to the calling of the Constitutional Convention of 1787. In this body he rendered a useful service by keeping a journal of the proceedings. In the actual drafting of the Consti-

tution he had a place second to none, and it was he who suggested the plan of Congressional representation on the basis of population. He was not able to have this principle applied to the Senate, because of the opposition of the small states. The ratification of the Constitution by the states was a second task to which he gave his finest efforts, and with Jay and Hamilton he published a series of brilliant essays in *The Federalist* which gave convincing reasons for its adoption. Madison's title of "Father of the Constitution" was well earned.

In the First Congress. In 1789 Madison was elected to the first House of Representatives. Though officially he was one of the Federalists, as the supporters of the Constitution were called, he found himself in sympathy with Jefferson, rather than with Hamilton, leader of his party, and eventually he aligned himself with the Anti-Federalists, the forerunners of present-day Democrats. In the House he performed notable constructive work, proposing the resolutions to create the State, War and Treasury departments, and suggesting the subject-matter of the first ten amendments to the Constitution. He remained in the House throughout Washington's administrations (1789-1797), and then retired to private life. During the administration of John Adams he did not take an active part in political affairs, but it is believed that the Virginia Resolutions of 1798 were written by him. These were a protest against the extension of Federal authority as exemplified by the passage of the Alien and Sedition Laws.

Secretary of State and President. When Jefferson became President, in 1801, he chose Madison as his Secretary of State. Exceedingly grave problems soon began to confront the administration, for France and England were at war, and in their efforts to conquer each other they trespassed heavily on the rights of neutrals on the seas. Neither the President nor his Secretary desired war, and they sought by every possible means through diplomacy to avert it. The result was a complication that neither Jefferson nor his successor could untangle. Madison himself was elected President for the term beginning in 1809, and he was reelected in 1812. His first term was largely occupied with fruitless negotiations with France and England, and in June, 1812, Congress declared war on England. (The military events of that struggle

Administration of James Madison, 1809-1817

I. THE PRESIDENT

- (1) Ancestry
- (2) Birth
- (3) Education and youth
- (4) Early career
- (5) Character
- (6) Death

independent of foreign manufactures.

- (2) Foreign
 - (a) Negotiations with England
 - (b) Macon Bill No. 2
 - (c) Napoleon's Rambouillet Decree

II. GOVERNMENT AFFAIRS

- (1) Domestic
 - (a) Revolutions in Florida
 - (b) Admission of Louisiana and Indiana
 - (c) End of the first Bank of the United States
 - (1) Expiration of charter
 - (2) Contraction of the currency
 - (3) Attempts to secure re-charter
 - (d) Changes in congressional procedure
 - (1) Development of power of the Speaker
 - (e) Trouble with the Indians
 - (1) Tecumseh and the conspiracy
 - (2) Battle of Tippecanoe
 - (f) Election of 1812
 - (1) Candidates
 - (2) Issue
 - (1) Leaders of public opinion
 - (a) Henry Clay
 - (b) John C. Calhoun
 - (c) Daniel Webster
 - (d) Andrew Jackson
 - (2) Effect on policy of the government
 - (a) Agitation for army and navy
 - (b) Monroe, Secretary of State
 - (c) New taxes
 - (d) New Embargo
 - (e) War
 - (h) Second Bank of the United States
 - (i) Tariff Law of 1816
 - (1) Essentially protective
 - (2) To make United States

III. WAR OF 1812

- (1) On land
- (2) At sea
- (3) Treaty of Ghent

IV. INTERNAL AFFAIRS

- (1) Hartford Convention
- (2) Gerrymandering
- (3) "Star Spangled Banner" written
- (4) Economic condition of the people

V. ELECTION OF 1816

Questions on Madison

Give a short sketch of Madison's career before he became President.

What states were admitted to the Union during his administration?

When did the charter of the Bank of the United States expire?

What were some of the effects of the closing of the bank?

Who was the first great Speaker?

What other public offices had he held?

To what group of statesmen did he belong?

What are some of the policies for which this group stood?

What effect did these men have on the policy of the government?

Why was the tariff law of 1816 passed?

When and for how many years was the second Bank of the United States chartered?

When was the war declared by Congress?

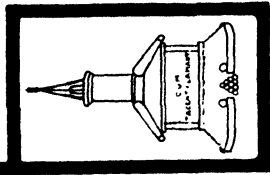
Name four important land battles of the war.

When was the Battle of New Orleans fought?

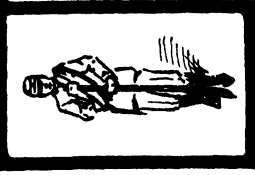
When was the Treaty of Ghent signed?

What was the origin of the term "gerrymandering"?

1817 JAMES ON 1809



MONUMENT, NEW ORLEANS

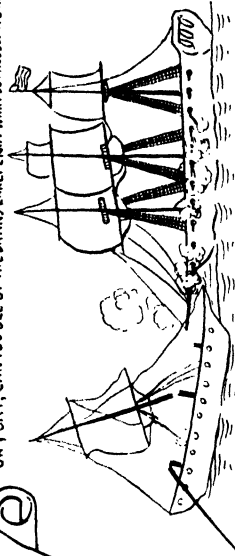
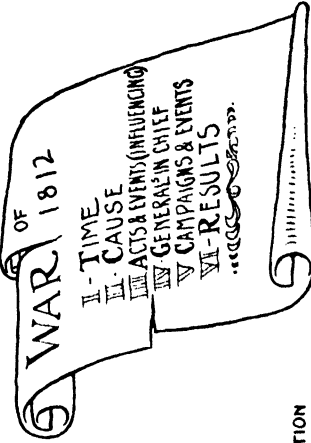
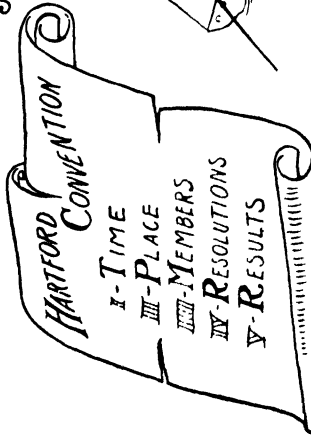


AMERICAN SOLDIER

THE STAR SPANGLED BANNER



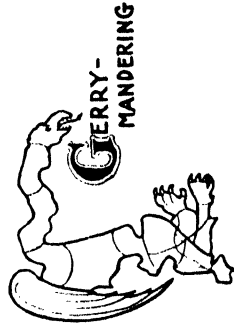
OH, SAY, CAN YOU SEE BY THE DAWNS EARLY LIGHT WHAT SO PRIDE WE HAILED



DESTRUCTION OF THE GUERRIERE BY THE CONSTITUTION



SEAL OF INDIANA



SEAL OF LOUISIANA

are related in the article WAR OF 1812.) On land the Americans suffered a number of humiliating reverses, and saw their national capitol burned. At sea their ships proved in every way the equal of those of the "mistress of the seas," and on the whole honors were about even. Both sides were glad to conclude peace, and a treaty was signed at Ghent, on December 24, 1814.

Madison's second term was marked by a strengthening of Federal authority. Though theoretically the Anti-Federalists were opposed to centralization of power, they virtually adopted the nationalist policies of the Federalists, and when Madison went out of office there was practically but one party. The Federalists, who had opposed the war, lost all public confidence through holding a convention at Hartford (Dec. 1814-Jan. 1815), at which, it was erroneously said, they advocated secession. Subsequently they disappeared as a distinct party. In 1816 Madison gave his approval to the chartering of a second United States Bank and to the passage of a protective tariff law, both measures being along the line of Federalist policies. Among other events of his administrations were the admission of Indiana and Louisiana as states, and the appropriation by Congress of large sums for public roads. Madison, however, vetoed the bill providing for public improvements.

The Private Citizen. When his second term was finished Madison retired to Montpelier, Va., where he spent twenty years, quietly and happily. His wife, Mrs. Dorothy Paine Todd Madison, survived her husband thirteen years. As the "Dolly" Madison of Washington society, she was one of the most fascinating of the ladies who have presided over the White House.

Related Articles. Consult the following titles for additional information:

Alien and Sedition Laws	Ghent, Treaty of
Banks and Banking	Hartford Convention
Constitution of the United States	Jefferson, Thomas
Continental System	Kentucky and Virginia Resolution
Embargo	Political Parties in the United States
Federalist, The	Tariff

MADISON, Wis., founded in 1837 and named for the fourth President of the United States, has been the capital of the state since its settlement, and is the county seat of Dane County. The city has a beautiful setting, for it is in the midst of rolling country, rich in agriculture and dairying, and is nearly surrounded by four beautiful lakes. It is

eighty-three miles west of Milwaukee and 130 miles northwest of Chicago, on the Chicago, Milwaukee, Saint Paul, & Pacific, the Chicago & North Western and the Illinois Central railroads. The first named road was built to the city in 1852.

Madison is known chiefly as an educational city. It is the home of the University of Wisconsin (see WISCONSIN, UNIVERSITY of) an institution which is the special pride of the state and is famous throughout the nation. The university buildings are close to the largest of the city's lakes. One of the finest buildings in the town is that of the State Historical Society, which contains a library of over 371,000 volumes and pamphlets. In the same building are the libraries of the university and of the Wisconsin Academy of Science, Arts and Letters. There are also legislative, state, law and Carnegie libraries. In all the libraries of Madison there are more than a million volumes and many thousand pamphlets.

The most imposing structure in the city is the new state capitol, standing in the center of the city and completed at a cost of over \$5,000,000. It is a building of great architectural beauty, and in its interior decorations probably only the Congressional Library at Washington excels it. The city has sixteen parks, aggregating 500 acres.

There is considerable manufacturing; the products of greatest note are electrical supplies, farm implements, dynamos, gas engines, machine tools, art glass and building materials. Population, 1930, 57,899.

MADONNA, a term now commonly used in all languages to refer to the Virgin in works of art. It was not until after A. D. 431, when the Council of Ephesus declared the Virgin Mary to be the Mother of God, that she was frequently represented in art, but after that time the number of paintings increased rapidly. In



early art she was painted with a robe of blue, starred or marked with gold and usually draped over her head. Byzantine models were followed up to the thirteenth century, when the revival of painting in Italy brought more natural and beautiful forms. Fra Filippo Lippi was the first to portray the in-

carnation of maternal love and childish innocence. Botticelli's two best productions represent the Virgin crowned and adored by dreamy angels. Only two of Leonardo da Vinci's Madonnas remain, both of which are charming representations. The Umbrian painters left striking and beautiful pictures of the Madonna, one of the best of which is the *Madonna Enthroned*, by Dosso Dossi, now in the Cathedral at Ferrara. Of Venetian painters, Giovanni Bellini and Titian stand out most prominently, and Titian's *Pesaro Madonna* in the Church of Frari, Venice, is the most celebrated. Of all the Italian painters of Madonnas, Raphael was the greatest. In his early period his theme was Mary the mother, while later he represented her as queen of heaven. Of his fifty or more excellent Madonnas, the most celebrated are the *Madonna of the Chair* and the *Sistine Madonna* (see below).

The artists of Northern Europe did not produce many famous Madonnas, and of these, few remain. The first in rank of the German Madonnas is the *Madonna of Burgomaster Meyer*, at Darmstadt, the work of Holbein. Rubens and Van Dyke also furnished excellent examples. Murillo is the representative Spanish painter, and his best works are to be seen in the Pitti Gallery, Florence, in the Corsini Palace in Rome and in the Louvre, Paris.

A few of the famous Madonnas now in the galleries are the following:

Madonna di Ansaldi, by Raphael (1506), the finest in England, in the National Gallery, London. Sometimes it is called the Blenheim Madonna, because it was purchased there in 1844 for \$350,000.

Madonna del Baldacchino (Madonna of the Canopy), by Raphael (1508), in the Pitti Palace, Florence. The Virgin, enthroned under a canopy, the curtains of which are raised by angels, sits with Jesus in her lap.

Belle Jardiniere (Pretty Gardener), by Raphael (1507), in the Louvre. The Virgin, seated in a meadow among flowers, is looking at the infant Jesus, who stands at one knee; at the other, Saint John kneels, holding a cross.

Madonna de Candelabri, or *Madonna de la Candelabras*, by Raphael (1516-1517), in London. On one side of the Virgin, who holds the infant Jesus, is a burning torch held by an angel. Because this was formerly in the Borghesi Palace it is sometimes called the *Borghesi Madonna*.

Madonna of the Basket, by Correggio (1520), in the National Gallery, London.

Sistine Madonna, by Raphael (1518), now in the Dresden Gallery, Germany. It represents

the Virgin supported on clouds and carrying the child Jesus in her arms. On one side Pope Sixtus II kneels in supplication. At the other side kneels Saint Catherine, and below, the two famous cherubs of Raphael are leaning. This picture was painted as an altar piece for the Church of San Sisto at Placenza, and it was finished just before Raphael's death (see Raphael).

Madonna of the Rocks, by Leonardo da Vinci, in the National Gallery, London. It takes its name from the appearance in the background of a grotto, with high rocks. The Virgin is presenting the infant John to Jesus, who, supported by an angel, is blessing him.

Madonna of the Rosary, by Domenichino, in the Bologna Gallery. Other paintings of the same name have been done by Murillo, Caravaggio and Van Dyck.

Madonna of the Chair (*Madonna della Sedia*), by Raphael (1516-1517), in the Pitti Palace, Florence. The Virgin is seated in a chair, clasping Jesus in her arms, while Saint John is depicted in adoration at the left.

There is one Raphael *Madonna* in the United States, the gift of J. P. Morgan to the Metropolitan Museum, in New York. It is entitled the *Madonna Colonna*.

MADRAS, *mah dras'*, a province of British India. With its dependencies, it comprises the extreme southern part of the peninsula of India. Its area, not including the natives states, is 141,726 square miles. It is surrounded by the sea on every side except the north and northwest, on which it is bounded by Orissa, the Central Provinces, the territory of Hyderabad and Mysore. The chief rivers are the Godavery, the Kistna and the Kavery. The climate of Madras is varied. The soil is sandy along the coast, but there are many fertile districts; iron, copper, lead and coal are found in considerable quantities. There are extensive forests in the province, yielding teak, ebony and other valuable timber trees. The principal vegetable products include rice, wheat, cotton, spices, sugar cane, tea and fruit. The people live in small villages, in which schools are slowly being established. The population in 1931 was 46,748,644, and the native protected states had in addition a population of over 5,000,000.

MADRAS, BRITISH INDIA, a maritime city, capital of the province of the same name, on the eastern coast of the peninsula of India. It is ill-situated for commerce, standing on an open surf-broken shore, with no proper harbor, though an area has been enclosed by piers so as to shelter a certain amount of shipping. Despite drawbacks,

however, Madras enjoys an extensive commerce, being the terminus of railways from Bombay and the south, and the headquarters of all the province departments. There are no manufactures worthy of mention, but the export and import trade amounts to millions of dollars annually. Madras was founded in 1639 by the English, and it soon became their chief settlement on the coast. It was taken by the French in 1746, but three years later it was restored to the English. In population it is exceeded only by Calcutta and Bombay among the cities of India. Population, 1931, 647,228.

MADRID, SPAIN, the capital and metropolis of the republic, is situated near the center of the Iberian Peninsula, on the small Manzanares River. It lies about 860 miles west of Rome and 660 miles southwest of Paris. Situated upon a high plateau, 2,150 feet above the sea, wind-swept from the snowy Guadarama, with unhealthy extremes of temperature, the city has no advantages except the fanciful geographical merit of being in the center of Spain. The principal streets are broad, long and airy, but the squares are generally irregularly built and deficient in decorative monuments. The royal palace, a combination of Ionic and Doric architecture, is one of the most magnificent palaces in the world.

Bull fights take place in the Plaza de Toros (bull ring), a building about 1,100 feet in circumference, which is capable of seating 13,000 spectators. The Prado, a boulevard on the east of the city, is one of the finest promenades in Europe, and beyond it is the park. In the Royal Museum of Painting and Sculpture, in the Prado, there are more than 2,000 pictures, many of them by the greatest masters of painting, especially those of Spain. The National Library, founded by Philip V, contains over 600,000 volumes. The university has an average attendance of 5,000 students, and there are numerous colleges, and medical, military and law schools. In 1917 there was erected a magnificent hospital, with accommodations for 200 charity patients.

Madrid has experienced considerable industrial development in recent years; it possesses a national tobacco factory and manufacturing of jewelry, chemicals, musical instruments, perfumes and other commodities. The city began to be a place of importance under Charles V, and in 1561 Philip II made

it the capital. Population, 1925, 820,000; 1934, estimated, 1,014,700.

MAELSTROM, *mal'strom*, the name of a tidal current or whirlpool off the northwestern coast of Norway, immediately southwest of the most southerly of the Lofoten Islands. The current is caused by the ebb and flow of the tides through the channel, producing an immense whirling motion. Formerly the water was supposed to be of such depth that it could not be sounded, but later explorations show that the depth does not exceed 120 feet. This whirlpool has been the subject of numerous legends by both medieval and later writers. When the wind is northwest it is at its worst at either high or low water, and in these circumstances it cannot be passed over with safety. At other times boats traverse it without difficulty.

MAETERLINCK, *me'tur link*, **MAURICE** (1862-), a Belgian poet, naturalist and dramatist, one of the outstanding literary figures of his day. His dramas, on which his fame largely rests, include *Monna Vanna*, perhaps his greatest work; *The Princess Maleine*, *The Blind*, *The Intruder*, *Home*, *The Blue Bird* and its sequel, *The Betrothal*. These plays, mystical and symbolic, are not well adapted for presentation on the stage. *The Blue Bird*, however, was a great success in America, and its presentation as a moving picture spectacle was regarded as a triumph of art. Maeterlinck's characters are not living human beings, but simply figures which the poet uses to express his morbid views on life and death. Another kind of work in which he has been exceedingly successful is essay writing. *The Treasure of the Humble*, *Wisdom and Destiny*, *Our Friend the Dog* and *The Life of the Bees* are charming studies. In 1911 Maeterlinck received the Nobel prize for literature. In 1921 he published *Tyltyl*.

MAFIA, *mah'fe ah*, a Sicilian (Italian) secret society, whose object is to protect its members from punishment for any crimes they may commit. Nothing is known definitely of its origin or its organization, but it is believed to have been founded to protect its members from oppression of former governments. The members take oath to obey their leader in all things, to keep the secrets of the order, never to go to law for any grievance and to help their fellow members in all circumstances. Branches of the Mafia have existed in various cities of the

United States, but have been inactive in recent years. The Fascist government of Italy, after a series of investigations of the activities of the Mafia in Sicily and southern Italy, finally in 1930 and 1931 brought hundreds of its members to trial and punishment.

MAG'DALEN, or **MAGDALENE**, **MARY**, that is, Mary of Magdala. She is mentioned in the New Testament as having had seven devils cast out of her, as watching the crucifixion and as having come early to the sepulcher on the resurrection morning. She was erroneously identified as the "woman who was a sinner" (*Luke VII, 37*), and hence the term Magdalen came to mean a penitent fallen woman.

MAGDALENA, *mahg dah la'nah*, a river of South America, which rises at the frontier of Ecuador, flows generally north through Colombia, and empties into the Caribbean Sea by several mouths. Its length is about 1,000 miles, and it is navigable for ocean steamers as far as Barranquilla, Colombia. The Magdalena is the chief thoroughfare for commerce in Colombia.

MAGDALEN, *mah' dah len*, **ISLANDS**, a group of islands in the Gulf of Saint Lawrence, fifty-four miles northwest of Cape Breton Island. The inhabitants depend for their support chiefly upon the fisheries. Lobster, cod, herring and seal are taken in great numbers. The chief settlements are House Harbor and Amherst. Population, about 5,000.

MAGDEBURG, *mahg'de boorK*, **GERMANY**, the capital of Prussian Saxony and a fortress of the first class, is situated on the Elbe, seventy-six miles southwest of Berlin. The city is chiefly on the left bank of the river, which here divides into three arms. The fortifications comprise the citadel and a number of detached forts and redoubts. Among the chief buildings are the Cathedral of Saints Maurice and Catharine, the churches of Our Lady, Saint Ulrich and Saint Paul, the Synagogue, the Rathaus and the old royal palace. The manufactures are varied, embracing machinery, castings, armor plates, chemicals, spirits, pottery, sugar, beer, cottons, ribbons, leather and tobacco. Magdeburg is the chief center of the beet sugar industry in Germany. The trade is extensive, both by rail and river. Magdeburg was first prominent in the tenth century, when it became the seat of an archbishop. It early distinguished itself in the Reformation. During the Thirty Years' War

the town was besieged, stormed and sacked by Tilly, and 20,000 persons are said to have been murdered. Population, 1933, 306,894.

MAGELLAN, *ma jel'lan*, **FERDINAND** (about 1470-1521), a Portuguese navigator, who conducted the first expedition around the world. He served in the Portuguese army in the Indies for a time, but was not well rewarded and offered his services to Spain. In 1519 he received the command of a fleet of five ships, with which he sailed westward, entered the straits since called by his name, and sailed into the Pacific Ocean. Subsequently he was killed in a skirmish with the natives on one of the Philippines, but one of his vessels completed the journey to Spain.

MAGELLAN, **STRAIT OF**, the strait which separates the continent of South America from the islands of Tierra del Fuego. It was discovered in 1520 by Magellan, for whom it was named. It is over 350 miles long and varies in breadth from two to seventy miles. This strait is the link between the South Atlantic and South Pacific oceans. The number of obstructing islands makes the channel difficult of navigation.

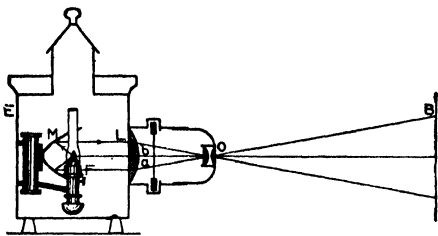
MAGGIORE, *ma jo'ray*, **LAKE**, or **LAGO MAGGIORE**, a lake partly in Northern Italy, partly in Switzerland, thirty-four miles in length and averaging two miles in breadth. It is 646 feet above the level of the sea and is in some places considerably over 1,000 feet deep. The lake is surrounded by picturesque mountains and verdure-clad hills, and on its shores are many prosperous towns.

MAGI, *ma'ji*, the hereditary priests among the Medes and Persians, set apart to manage the sacred rites and to preserve and propagate the sacred traditions. They acted also as diviners and astrologers. The magi possessed great influence, both in public and private affairs, conducted the education of the princes and were constant companions of the monarchs. Their order was reformed by Zoroaster, who compelled them to live the severe and simple lives that the law had laid down for them. The name *magi* came also to be applied to holy men or sages in the East. The wise men that came from the East to worship Jesus were magi, whose names given by tradition were Melchior, Balthasar and Gaspar. In later times the magi degenerated into jugglers and fortune tellers.

MAGIC, *ma'fik*, the pretended art or practice of producing wonderful effects by the aid of superhuman beings or of departed

spirits or the hidden powers of nature. A large proportion of magical rites are connected with the religious beliefs of those using them, their efficiency being ascribed to supernatural beings. There is, however, an element in magic which depends on certain imagined powers and natural powers, that can be utilized in various ways. In savage countries the native magician is often sorcerer and priest, and sometimes chief of the tribe. Among the ancient Egyptians magic was worked into an elaborate system and ritual, and it was regularly practiced among the Babylonians and Assyrians, as well as in Greece and Rome. The term is also, though wrongly, applied to the operations of sleight-of-hand performers.

MAGIC LANTERN, or **STEREOPTICON**, an instrument used for projecting upon a screen a highly magnified image of a transparent picture or some other object. The important parts of the magic lantern are (1) the box, *E*, which may be of wood or metal, but must be light-tight and must contain a chimney and openings for the admission of the air; (2) the light, *F*, back of which in some lanterns there is a concave mirror, *M*; (3) the condenser, *L*; (4) the slide or picture to be magnified, *a b*; (5) the magnifying glass or objective, *O*. The condenser collects the rays of light from the lamp and concentrates them upon the slide. As they pass through the object glass they are caused to expand and produce an enlarged image of the picture upon the screen, *B*. Since the rays cross in the object glass, the image is inverted, and in order to have



MAGIC LANTERN

it appear erect the slide must be placed in the lantern in an inverted position. The light employed in the best instruments is the calcium, or lime, light, or the electric light.

The magic lantern is extensively used as an educational appliance, in teaching geography and history in elementary schools and for scientific purposes in high schools and col-

leges. It is an admirable device for a study of objects that can best be examined when at rest, but as a source of entertainment it has been superseded by moving-pictures.

MAGNA CHARTA, *mag'na kahr'tah*, or **GREAT CHARTER**, a document forming part of the English Constitution and regarded as the foundation of English liberty. It was extorted from King John by the confederated barons in 1215. Its most important articles are those which provide that no freeman shall be taken or imprisoned or proceeded against except by the lawful judgment of his peers or by the laws of the land; and that no scutage or aid shall be imposed in the kingdom (except certain feudal dues from tenants of the crown), except by the common council of the kingdom. The remaining and greater part of the charter is directed against the abuses of the king's power as feudal superior. The charter was confirmed several times during the reigns that succeeded John's and the form adopted in the reign of Edward I was set down in the statute books. The most accurate and complete copy of the original charter is that preserved in Lincoln Cathedral. Two other copies are exhibited in the British Museum, and there is a fourth copy in Salisbury Cathedral. See **JOHN**.

MAGNESIA, *mag ne'zhe ah*, a white, tasteless, earthy substance of an alkaline nature. It is almost insoluble, is an absorbent and possesses laxative qualities in a mild degree, being used as a medicine for dyspepsia. Magnesia is a compound of the elements magnesium and oxygen. It withstands a high temperature, and is used in making protective mixtures for steam pipes and vessels exposed to intense heat.

MAGNESIUM, *mag ne'zhe um*, a silvery-white metal, with a brilliant luster. Although magnesium is not found separate in a state of nature it is one of the widely distributed elements in such mineral compounds as chrysolite, dolomite, hornblende, serpentine, soapstone, tourmaline and meerschaum. Heated to redness in oxygen gas it burns with brilliancy and combining with oxygen it becomes magnesia or the oxide of magnesium. A magnesium light is rich in chemical rays and is now employed to some extent in photography. Magnesium is also used in making fireworks. Combined with sulphur and oxygen it forms a white solid found in several varieties. One of these water forms Epsom salts.

MAGNET. See MAGNETISM.

MAGNETIC NEEDLE. See MAGNETISM; COMPASS.

MAGNETIC EQUATOR, *e kwa'tor*, an imaginary line encircling the earth connecting points at which a dipping needle assumes a horizontal position (see DIPPING NEEDLE). At all points on the magnetic equator, therefore, the dip is zero. Its course is near the geographic equator, never reaching more than 16° north or south of it.

MAGNETISM, the power of certain objects to attract iron, steel, and a few other substances. Bodies which have this power are called *magnets*, a name probably derived indirectly from the city of Magnesia in Asia Minor, near which many *natural magnets*, or *loadstones*, are found. Loadstones are found in many parts of the world and are composed chiefly of *magnetite*, or black oxide of iron,



1—BAR MAGNET. 2—HORSESHOE MAGNET

whose chemical formula is usually given as Fe_3O_4 .

When a magnet is dipped into a mass of tacks or iron filings and removed, the bits of iron cling to it in certain spots, usually two in number, while they are attracted little or none at all by other parts of the magnet. These spots are known as the *poles* of the magnet.

Pieces of iron and steel brought near a magnet become magnets themselves and attract bits of magnetic substances. This is known as *induced magnetism*; the process is *magnetic induction*. Iron is much more quickly and easily magnetized than is steel, but loses its magnetism almost entirely when the original magnet is removed. Steel retains its magnetism indefinitely, the retentivity varying a great deal with the type of steel and the heat treatment to which it has been subjected. Small steel objects such as needles, knife blades, and pieces of clock or watch springs may be readily magnetized by induction. They are magnetized more quickly and completely if stroked slowly with a pole of the original magnet, *in one direction only*, or if they are hammered while in the neighborhood of the magnet. Steel is now more commonly magnetized by placing it inside a coil through which a powerful direct current of electricity is passing. See ELECTRO-

MAGNET; ELECTRO-MAGNETISM. When great magnetic force is desired, magnets are usually U-shaped, so that the poles are close together. All magnets tend slowly to lose their magnetism. This tendency is in large part counteracted by the use of "keepers", or *armatures* (which see).

If a bar-shaped piece of steel or a needle be strongly magnetized and suspended by a long silk thread balanced on the point of a needle or floated on a thin cork, so that it is free to turn, it will come to rest with one pole pointing in a general northerly direction. Such a *magnetic needle* is really a compass (which see), and is very useful in experiments with magnets and magnetism, as well as for telling directions.

The pole of a magnet which tends to point toward the north is known as the north-seeking pole, or simply as the *north pole* of the magnet, while the opposite pole is the *south pole*. If the north pole of a magnet be brought near the north pole of a suspended magnet or magnetic needle, the one which is free to move will be repelled, but a north pole and a south pole attract each other. This behavior is universal and is expressed in the following rule: *Like poles of magnets repel, unlike poles attract, each other.* It will be found that the magnetism induced by a strong magnet may overcome the permanent magnetism of a weak magnet, thus making an apparent exception to the rule. The rule will be found to hold, however, if such combinations are not brought too close together. The earth acts as if it were itself a huge magnet. Because of that property, magnetic needles orient themselves in a certain way over the surface of the earth and make possible their use as compasses.

If a magnet be placed beneath a piece of cardboard on which iron filings are sprinkled while the board is tapped gently, the filings arrange themselves in lines which tend to spread through the space all about the magnet and to pass from one pole to the other. Such lines are known as *lines of force* and occur in all regions which are under the influence of magnets, that is, in all *magnetic fields*.

Magnets lose much of their magnetism if hammered or dropped repeatedly. They are completely demagnetized if heated red-hot and allowed to cool outside the influence of other magnets. If a bar-magnet be broken, new poles appear on the broken ends, so that there are two complete magnets instead of

one. These phenomena together with many others have led scientists to believe that each tiny molecule in iron is itself a magnet, that when a piece of iron or steel has many or all of its molecules arranged with their north poles pointing in one direction, the piece is magnetized, and when it is treated in such a way as to destroy this systematic arrangement, the magnetism is lost.

The facts that magnetism can be produced by currents of electrons (see **ELECTRICITY**, subhead *The Electron Theory*), that the molecules of iron and steel act as if they are tiny magnets, and the modern theory that atoms contain electrons revolving in orbits, all fit into a single great scheme of relationships about which scientists know a great deal, but which is not yet entirely clear to them.

Related Articles. Consult the following titles for additional information:

Compass	Magnetic Equator
Electro-Magnet	Magneto-Electric
Electro-Magnetism	Machine

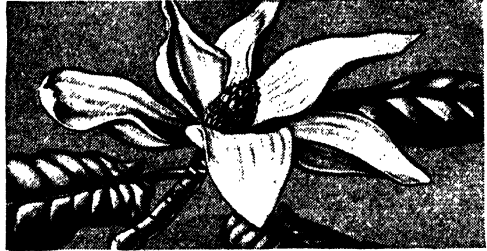
MAGNETO-ELECTRIC MACHINE, or **MAGNETO**, a machine for generating electric current by the use of permanent magnets. The magneto consists of one or more powerful permanent magnets with an armature mounted between the poles in such a way that it may be rotated rapidly, or, in some cases, oscillated. The armature has many turns of wire wound about a soft iron core. As the armature is rotated, its coil of wire passes through an intense magnetic field, which induces an electro-motive force in the coil. This electro-motive force is first in one direction and then in the other, that is, it produces an alternating current, and its strength increases as the speed of rotation is increased.

Hand-operated magnetos are still used in rural sections for ringing the call bells of telephones. Magnetos are also extensively used to produce sparks for ignition in stationary gasoline engines, trucks, and tractors. For multiple cylinder motors, the high-tension magneto is used. This is a combination of magneto and induction coil (which see). Magnetos on one-cylinder engines frequently have armatures which oscillate instead of rotating. See **DYNAMO-ELECTRIC MACHINE**; **ELECTRO-MAGNET**; **MAGNETISM**.

MAGNIFICAT, the song of the Virgin Mary, *Luke I*, 46-55, so called because it commences with this word in the Latin *Vulgate*. It is sung throughout the Western Church at vespers, or evensong.

MAGNOLIA, a genus of trees and shrubs,

remarkable for their rich green foliage and large, beautiful flowers. There are more than a dozen species, most of which are natives of subtropical Asia and North America, but they have been long cultivated extensively in the warmer parts of Europe. The *great-*



MAGNOLIA

flowered magnolia is the most beautiful of several species that are native to the Southern states. This is a magnificent evergreen, which bears large leaves, fragrant, white flowers nearly a foot in diameter, and scarlet cones. These cones, which are the fruit of the plant, open when they are ripe, and the bright red seeds hang suspended from fine threads like cobwebs. The *cucumber tree*, the *melon tree*, the *mountain magnolia* and the *sweet bay*, *white laurel* or *swamp sassafras* are other native species. The magnolia is the official flower of Georgia, Louisiana and Mississippi.

MAG'PIE, a bird of the crow family. There are several species, two of which belong to America and are found from the



MAGPIE

Arctic regions to California. The American magpie is a handsome black and white bird and a determined robber of other birds' nests. The European magpie is a fine, black bird, with white patches on its belly and shoulders. It is celebrated for its crafty instincts, its power of imitating words, its continuous chatter and its habit of stealing every glittering article it sees.

MAGYARS, *mod'yahrs*, the name used by the dominant race in Hungary, which, prior to the World War (1914-1919), was a constitutional kingdom in the Austro-Hungarian monarchy. The Magyars are related to the Finns, and trace their descent to a horde of barbarians that invaded Central Europe from regions east of the Carpathian Mountains, about A. D. 900. They have occupied Hungary for about ten centuries, and now number over 8,000,000. During the World War the Magyars loyally supported the Central Powers. See HUNGARY; WORLD WAR.

MAHABHARATA, *ma hah bah'ra ta*, an epic of ancient India of about 220,000 lines, divided into eighteen books, the leading story of which narrates the history of the war between the Kauravas and the Pandavas for the possession of the ancient kingdom of Bharata, which is said to have comprised the greater part of India. The Pandavas, who are represented as incarnations of heroism and goodness, are finally victorious. The authorship of the epic is attributed to Vyāsa, "the arranger," but this simply means that the materials of which the poem consists were at some time welded together with a certain order and sequence so as to form one work.

MAHAN', ALFRED THAYER (1840-1914), an American naval officer and author, an authority on sea power, was born at West Point, N. Y. He was graduated from the United States Naval Academy and at once entered the navy, serving until he was retired in 1896 at his own request. For several years he was president of the Naval War College at Newport; he was a member of the naval board of strategy during the war with Spain, and the next year he was one of the American representatives to the peace conference at The Hague. He wrote a number of historical works, of which the most important were *Influence of Sea Power upon History*, 1660-1783, and *Life of Nelson*. It is said that the first-named book influenced Emperor William II of Germany so profoundly that he began at once to build the great navy which his country surrendered in 1918.

MAHATMA, *muh haht'muh*, a word from the Sanscrit, meaning great-souled. The English-speaking world is familiar with it from its application to Mohandas Karamchand Gandhi, better known as Mahatma Gandhi. The term is never adopted by a person for himself, but is bestowed as a mark of supreme respect. One who has not reached

the highest spiritual levels can hope to attain the name, which carries with it the belief that the bearer possesses endowments akin to the supernatural. In these volumes see GHANDI, MOHANDAS KARAMCHAND.

MAHDI, *mah'de*, the name given by certain Mohammedans to the expected Messiah who will at some time appear to finish the work begun by Mohammed. He is to destroy all infidels and divide the world among the faithful. The appearance of such a being was prophesied by Mohammed. Many professed Mahdis have appeared from time to time in Africa as well as Asia, the latest being Mohammed Ahmed, the leader of the Sudanese insurrection (1883-1885). He made the chief city of Kordofan his capital and annihilated the Egyptian army, November 5, 1883. His influence extended to the Red Sea. The Mahdi died in 1885. See GORDON, CHARLES GEORGE.

MAHOG'ANY, a tree which produces one of the most valuable woods used in furniture making. It is native to Mexico, Central America and the West Indies, and is known botanically as *Swietenia mahogani*. The tree is also found in the Florida Keys, but there it grows only to medium size. Ordinarily it attains a height of forty to fifty feet and a diameter of six to twelve feet. It bears compound leaves similar to those of the ash, and small five-petaled flowers. The seeds are contained in a woody capsule.

Mahogany wood is remarkable for its hardness, closeness of grain and beauty, the dark red color and satiny finish of the polished wood being exceedingly attractive. Because of the scarcity of genuine mahogany and its high cost, various substitute woods are in great demand in furniture making. A related species of the genus *Cedrela*, found in Central America, is used in large quantities. It resembles true mahogany in general appearance, but is lighter and less durable. Other substitute woods are found in Australia, Africa and the Philippines.

MAHOM'ET. See MOHAMMED.

MAHRATTAS, *ma rat'tas*, a people inhabiting the western part of the peninsula of India and numbering from 15,000,000 to 20,000,000. They are of mixed blood, speak the Hindu language and are followers of the Hindu faith. In the latter part of the seventeenth century they rose rapidly and were instrumental in depriving the Mogul Empire of much of its power. In the latter part

of the eighteenth century they were overpowered by the Afghans and later became subject to the British government.

MAID'ENHAIR, the name given to beautiful ferns, of which there are many widely distributed species. The common maiden-



MAIDENHAIR FERN

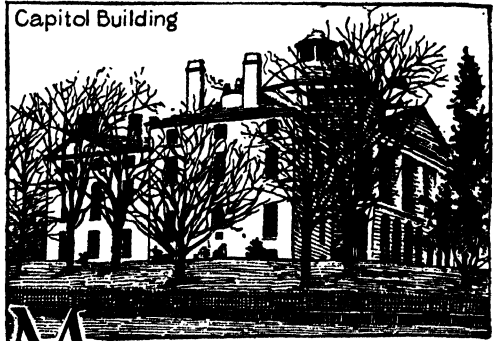
hair of North America bears a cluster of upright, brown, shiny, wiry stalks, upon the top of which the graceful fronds expand horizontally. In some cultivated species these fronds are exceedingly delicate, and in all, the rounded, scalloped leaflets are characteristic.

MAID OF ORLEANS. See **JOAN OF ARC**.

MAIM'ING, a statutory offense consisting of permanent injury wilfully inflicted on men or animals. When on human beings it is known as mayhem (which see). Another legal term for maiming is *mutilation*. The offense is designated as a felony (which see).

MAIN, *mine*, a river of Germany which rises in the Fichtelgebirge, a mountain chain in the northern part of Bavaria. The Main flows in a general westerly direction for 300 miles and joins the Rhine a little above the town of Mainz. For about 200 miles from its mouth it is navigable. By means of the Ludwig Canal it affords through navigation to the Danube, and between Mainz and Frankfort it has been canalized.

Capitol Building



M **AINE**, *mane*, called the **PINE TREE STATE** because of its widespread forests of pine, is the largest of the New England states and the most northeasterly state of the Union. It touches two Canadian provinces, New Brunswick on the northeast and east, and Quebec on the northwest. The entire frontier of New Hampshire, except 18 miles of sea-coast, adjoins Maine's western boundary line; the southern boundary is the Atlantic Ocean. Maine lies in approximately the same latitude as the southern half of France, but it has a more rigorous climate.

Area and Population. The extreme length of the state is 303 miles, and the extreme width is 212 miles. It has a total area of 33,040 square miles, making it a little larger than South Carolina and a little smaller than Indiana. It is the thirty-eighth state in the Union in size. The coast in a direct line from Eastport to a point opposite Portsmouth extends 218 miles, but because of the numerous indentations Maine has really about 3,000 miles of seacoast; it has proportionately more good harbors than any other part of the Atlantic coast.

The Federal census of 1930 gave Maine a population of 797,423, a gain of 3.8 per cent in 10 years. One-seventh of the inhabitants are French and English Canadians. Approximately 60 per cent of the population live on farms or in villages of less than 2,500 population. The Indians in the state, about 1,000 in number, have adopted the customs of civilization.

Surface and Drainage. Though there are no towering mountains nor scenery of extraordinary grandeur, the state as a whole is one of the most beautiful regions east of the Mississippi, with its fragrant evergreen forests, diversified by hundreds of clear, cold lakes, its verdure-clad hills, its rapidly-flowing rivers with their picturesque waterfalls,

and its rugged coast fringed with islands. The interior is generally hilly. A height of land, lying on the west near the source of the Magalloway River, extends across the state in a northeasterly direction, reaching the eastern border at Mars Hill. At its western extremity this elevation is 2,000 feet high, but its altitude gradually lessens until at the eastern boundary it is only 600 feet high. To the north of this divide the country is drained almost wholly into the Saint John.

The state contains a number of mountain peaks, which, though apparently detached, belong to the Appalachian system. The most noted of these is Mount Katahdin, 5,267 feet above sea level, in the central part of the state. Others worthy of mention are Mount Abraham, 3,387 feet; Mount Bigelow, 3,600 feet; Saddleback, 4,000 feet; Mount Blue, 3,900 feet; Bald Mountain, Mount Kineo and Mount Haystack are also well known. That portion of the state south of the divide is hilly and broken. The numerous islands off the coast and the irregular coastline with its numerous good harbors are due to glacial action in ages gone and to erosion caused by the restless sea.

The Saint John River and its tributaries drain nearly all the state north of the divide; the southern portion is drained by the Penobscot, Kennebec, Androscoggin and Saint Croix rivers, all of which are rapid streams and furnish excellent water power.

There are over 1,500 lakes; many of them are famed for their beauty and for their excellent fish. The most noted of these is Moosehead Lake, in the west-central part of the state. It has an area of 120 square miles, and is the largest inland lake in New England.

Climate. Maine has long, cold winters, and snow covers the ground from three to five months. The summers are cool, and even in the southern portion the farmer has not more than five months in which to mature his crops. The prevalence of forests, the fine river drainage, the bracing air and the sea breezes have all tended to make the climate very healthful, and summer tourists visit its attractive resorts in large numbers. Among these resorts are Bar Harbor, on Mount Desert Island (now Acadia National Park), Rangeley and Moosehead lakes, Mount Katahdin and Old Orchard Beach.

Minerals. The mining industry of Maine is comparatively unimportant. Granite is

found in the southern part of the state, and the quarrying and shipping of this stone form the chief mineral industry. For many years Maine ranked next to Vermont and Massachusetts in the production of granite but it has been surpassed in this regard by five other states. Large quantities of lime are made from the extensive limestone deposits of Knox County, and a good quality of slate is found in the central part of the state. Slate is quarried for table tops, blackboards, roofing and for finishing interiors. The slate from Piscataquis County is remarkably pure, is of a deep black color and can be split into thin plates.

In some localities there are deposits of feldspar and silica of excellent quality. Some of the products made wholly or in part of this feldspar and silica are glass, porcelain, sandpaper, scouring soap and earthenware.

There is a famous tourmaline deposit in Oxford County, from which the largest and most beautiful crystals known have been taken. There are about thirty mineral springs of commercial importance. Water from the famous Poland Spring is shipped even to foreign countries.

Forests. Maine is yet an important lumber producing state, although it has declined steadily from its eminence in the first half of the nineteenth century. Woodlands still cover more than three-fourths of the total area. The primeval forests of pine are exhausted, but a good-sized second growth is now furnishing material for the lumber mills. The spruce forests are the most extensive and the most heavily drawn upon at the present time; 600,000,000 feet of lumber can be taken yearly without exhausting the supply. A belt of white birch, extending across the state, furnishes wood for spools. This spool timber is shipped extensively to Scotland. Large quantities of cedar are found in the Saint John and Penobscot basins, and maples and poplars also flourish. Because of the rapid destruction of forests, both the state and private corporations are taking active measures for the preservation of the timber, and the reforestation of denuded areas.

Fisheries. The fisheries of Maine are the most important of the New England States, except those of Massachusetts. Particularly notable are the catches of lobster and other shellfish and a species of herring used in the sardine canning industry. In addition, the Maine industry relies on the mainstay

of the New England fisheries, namely, cod, haddock and mackerel. The rivers are so well stocked with the choicest fish that Maine is a sportsman's paradise. Salmon, other than the land-locked variety, are chiefly taken from the famous Bangor Pool in the Penobscot. The first catch of the season is traditionally sent to the President of the United States.

Agriculture. The chief crop of the state, judged by market value, is potatoes. Cultivation of this crop has developed largely in the twentieth century and it has centered in Aroostook County, the northernmost of Maine counties, because of the fertile soil and the application of large-scale, machine methods to this branch of agriculture. The potato crop of the state has reached 42,000,000 bushels and occasionally even a higher figure; in value and in bulk the potatoes of Maine have led the nation. Aside from the production of corn for canning, the agriculture of the state is not specialized. Small farms raise oats, corn, and hay; these crops are fed to the beef cattle, dairy cows and other livestock. Apples are grown in all parts of the state and as a crop follow potatoes, hay and oats in value. The most important agricultural experiment station is situated at the University of Maine.

Manufactures. The earliest industries in Maine were based largely upon the presence of raw materials and upon extensive and convenient water power. Thus shipbuilding flourished because of the nearness of white pine and the multitude of safe harbors. For a period following 1850 Maine built more ship tonnage than any other state and Bath was the chief shipbuilding center of the United States. Since the exhaustion of primeval timber supplies and the shift to steel as material, the industry has declined and the shipbuilders at Bath have turned to the production of steel vessels.

The lumber industry was also based upon natural resources and Bangor was the largest timber market in the United States in past decades. Lumber still ranks as the fifth industry in the state. The manufacture of paper and pulp, built upon Maine spruce and to some extent upon imports from Europe and Canada, outranks by far the other industries in the state in the value of its product. Other important industries are woolen and worsted goods, boots and shoes, and canning and preserving of fish, fruits

and vegetables. The manufacture of cotton goods is not extensive; it is concentrated at Lewiston, Biddeford and Saco. In general manufactures are localized in the southwestern part of the state. Maine leads the New England states both in developed and potential water power. The complete use of the latter is delayed by the expense of the projects.

Transportation. The coast of Maine abounds in good harbors; the Penobscot and Kennebec are each navigable for about sixty miles. Portland is connected by freight steamers with Boston, New York and certain Canadian ports; it is also the port for several trans-Atlantic cargo ships. With 2,190 miles of railway the state is well supplied. The Grand Trunk and the Canadian Pacific are important trunk lines, connecting with other great systems of the United States and Canada, thus giving direct communication with the central and extreme western portions of the country. The Boston & Maine, another important system, makes similar connections through Boston and New York with the southern states. The Maine Central and the Bangor & Aroostook connect various places within the state. Portland is the chief railway center.

Government. The legislature consists of a senate with thirty-three members and a house of representatives with 151 members elected biennially by popular vote. The governor is elected for a term of two years. His council, consisting of seven members, and the secretary of state and the state treasurer are elected by the joint ballot of the legislature. As in other New England states, the local government is largely in the hands of town officers. The supreme court consists of five judges appointed by the governor and council for a term of seven years. The eight judges of the superior court which meets throughout the state and the judges of the inferior courts, except those of the probate courts, are also appointed by the governor and council. The probate judges are chosen at popular election for a term of four years. The attorney-general is elected biennially by joint ballot of the legislature.

Maine's general elections are held in September, although in all other states they are held in November. Therefore Maine's vote is considered as a political barometer; there is a familiar saying that "As Maine goes, so goes the Union."

MAINE

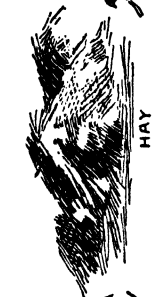
THE PINE TREE STATE



PINE CONE & TASSEL



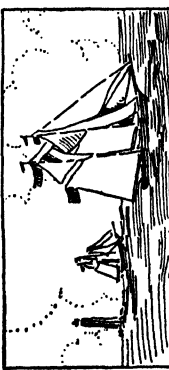
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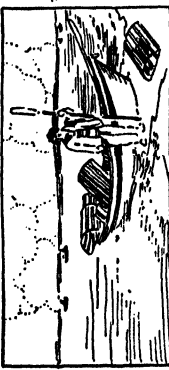
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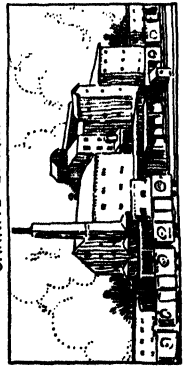
FISHING SCHOONER



LOBSTER FISHING



GRANITE QUARRY



FLOUR MILL



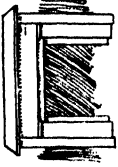
FISH



POTATOES



GARDEN VEGETABLES



SLATE MANTEL



OATS



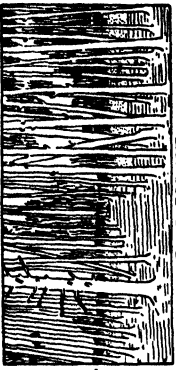
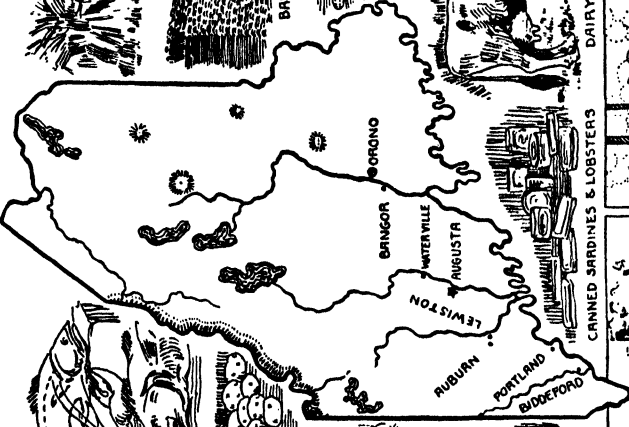
BARK USED IN TANNING



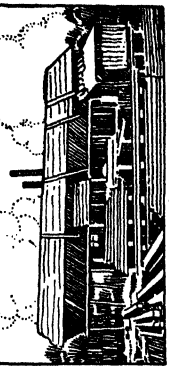
SWEET CORN



DAIRY COW



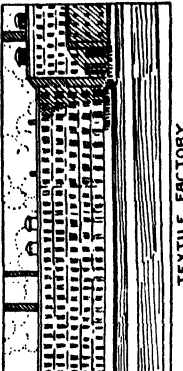
PINE FOREST



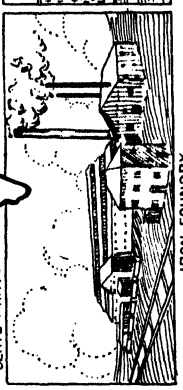
LUMBER MILL



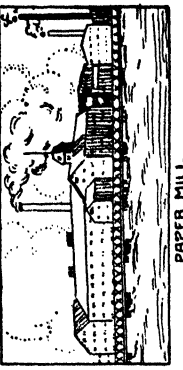
A HUNTERS CAMP



TEXTILE FACTORY



IRON FOUNDRY



PAPER MILL

Items of Interest on Maine

Maine is nearly as large as all of the remainder of the New England states combined, and is about three-fourths the size of Old England.

It ranks thirty-fifth among the states of the Union in population, with a density of about twenty-seven inhabitants to the square mile.

Illiteracy among the native whites in Maine is less than two per cent.

The Indians living in Maine are survivors of the Abenaki tribe.

Maine spends more than \$11,000,000 a year in support of schools.

Mount Katahdin is composed chiefly of granite, large sections of which are exposed on its slopes. Lichens grow on the bare summit.

The irregular coast of the state resembles the Norwegian fiord-cut shore.

Mount Desert Island was created a national park in 1917; the park was named first in honor of the French hero, Lafayette, and later Acadia National Park.

The value of the forest products of the state, including the pulp and paper industry, is over \$125,000,000 a year. Maine makes a yearly appropriation of \$73,000 for the upkeep of the state forests.

The state produces one-third of the feldspar of the United States. The total annual income from minerals is about \$3,400,000.

The first cotton mill in Maine was built at Brunswick in 1809.

Maine has had but one constitution; it was adopted in 1819, but has been amended many times.

In 1917 a budget system was introduced for the first time in the history of the state.

Well on toward a million of pleasure-seekers visit Maine during a year.

Thoreau paid a just tribute to the beauties of the state in his narratives of his journeys as a naturalist.

Longfellow, Hawthorne and John S. C. Abbott, the historian, were classmates at Bowdoin College. After Longfellow's graduation he was appointed professor of

modern languages at Bowdoin.

Questions on Maine

In what part of the United States is Maine?

How many miles of seacoast has it?

Which are the most important rivers of the state? Why are they important?

What is the character of the climate?

Why is the state frequented by tourists in summer?

What is the population of Maine?

What are the leading industries?

Name the principal cities. The principal summer resorts.

Which are the main railway lines?

Name the leading educational institutions.

Who were some of the earliest explorers of Maine?

When and where was the first English settlement established?

When was Maine admitted to the Union?

With what other state is it connected historically?

How many constitutions has Maine adopted?

Why is Bowdoin College of special interest?

What is the leading vegetable crop?

What is the banner county of the Union in this product?

Why is Maine called the PINE TREE STATE?

What is the highest peak in Maine?

Was Maine one of the thirteen original states?

What constitutes the divide of the state?

How does Maine rank as a fishing state?

In what respect has the shipbuilding industry changed?

What town has led in shipbuilding for a hundred years?

What trunk lines connect with the railway system of the state?

How was the boundary dispute settled?

What great mountain system is represented in the state?

What European seacoast is similar to the coast of Maine?

Education. The town system of common schools is in use, the town being the smallest unit for their administration. A state superintendent of schools is appointed by the governor and council for a term of three years. A compulsory school law which covers the ages of seven to fifteen is well enforced. All cities and the larger villages maintain graded schools and high schools. There are state normal schools established at Castine, Farmington, Gorham, Presque Isle, Machias and Fort Kent. Other prominent educational institutions are Bowdoin College at Brunswick, the University of Maine at Orono, Colby College at Waterville, and Bates College at Lewiston.

Other Institutions. The Maine General Hospital, the school for the deaf and a United States Marine Hospital are conducted at Portland. There is a United States soldiers' home at Togus. The hospitals for the insane are at Augusta and Bangor; in the latter city also is an orphans' home. A children's home is established at Bath; other children's aid institutions are conducted in several parts of the state. The state prison is at Thomaston, the state school for boys at South Portland and the state industrial school for girls at Hallowell.

Cities. There are eleven cities with populations of more than 8,000. The first five in order of size are: Portland, Lewiston, Bangor, Auburn and Biddeford. Augusta is the capital.

History. Maine was visited by the earliest explorers, perhaps by the Norsemen, about A. D. 1,000, by Verrazano in 1524, by Sir John Hawkins in 1565; by Gilbert in 1583; by Gosnold in 1602, and by John Smith in 1614. The first English settlement was established at the mouth of the Kennebec River in 1607, under the auspices of the Plymouth Colony, and was directed by George Popham, but the rigorous climate caused the abandonment of the settlement in the following spring. In April, 1622, Sir Fernando Gorges and George Mason received the grant of land between the Merrimac and the Kennebec. When this grant was later divided Gorges received the strip between the Piscataqua and the Kennebec. A settlement was made at York; this was the first chartered "city" in America. Later settlements were made at Saco, Biddeford, and Scarborough, but all were destroyed by Indian uprisings. In 1677 Massachusetts purchased the whole

territory to which she earlier had asserted claims and Maine was united with it by charter in 1692. Maine did not have a separate existence until it was admitted to the Union as a state in 1820.

The chief public question in the state's affairs between that date and the Civil War was the management, settlement and sale of vast areas of land owned by the state and situated in the interior. Every legislature was vexed with the problem; frequent disputes arose with Massachusetts because the latter retained land grants in the same area. Trouble arose also over the precise location of the boundary between Maine and New Brunswick; a bitter quarrel, the "Aroostook War" of 1839, was settled by a compromise line determined in the Webster-Ashburton Treaty of 1842. Maine also attracted national attention by the passage in 1851 of the first state prohibition law.

In 1908 the initiative and referendum were adopted by popular vote; later laws were passed regarding child labor, workmen's compensation, old age pensions, inheritance and estate taxes, banking and a flexibility act redistributing administrative functions.

Related Articles. Consult the following titles for additional information:

Auburn	Moosehead Lake
Augusta	New Bedford
Bangor	Parks, National
Bar Harbor	Penobscot
Bath	Portland
Biddeford	Saco
Katahdin	Saint John River
Kennebec	Waterville
Lewiston	Webster-Ashburton
Missouri Compromise	Treaty

MAINTENON, *maN t'nohN'*, FRANÇOISE D'AUBIGNÉ, Marquise de (1635-1719), second wife of Louis XIV. Left quite destitute in her tenth year, Mademoiselle D'Aubigné spent her youth in dependence on her rich relatives, and was glad to contract a marriage with the famous wit Scarron, a deformed, old and infirm man. Her beauty and intelligence gained for her powerful friends among those who frequented her husband's house; and on Scarron's death she was intrusted with the charge of the children born to Louis XIV by Madame de Montespan. She assumed this office and soon so captivated the king that he married her privately in 1684. For the remaining years of his life she was his most confidential adviser.

MAINZ, *mynts*, GERMANY, a fortified town in Hesse, situated on the left bank of the Rhine, opposite the mouth of the Main, twenty miles west-southwest of Frankfurt.

It is the largest town in Hesse, and one of the oldest in Germany. The older part of the town was modernized after the destruction caused by a powder-magazine explosion in 1857, and an extensive new quarter has been added since the recent widening of the fortified circuit. The manufactures embrace leather, furniture, hardware, carriages, tobacco, beer, chemicals, musical instruments and cars. The trade, particularly transit, is extensive. Mainz was long the first ecclesiastical city of the German Empire, of which its archbishop-electoral ranked as the premier prince. Its history during the sixteenth century is of considerable interest in connection with the progress of the Reformation. Population, 1933, 142,627.

MAIZE, one name of the common corn, or Indian corn. See CORN.

MAJESTY, a title bestowed upon kings and queens. The former kings of France were addressed as "most Christian majesty," the former kings of Portugal, as "most faithful majesty;" the kings of Hungary, "apostolic majesty;" the kings of Spain, "most Catholic majesty." The emperor of Germany bore the title of "imperial royal majesty."

MAJOLICA, a beautiful enamel earthenware, decorated in colors. It was first made in Spain, but reached its highest splendor in Italy. There the term is applied to all such wares, but by artists it is restricted to such as are decorated with a fine metallic luster or to the richly decorated wares of the fifteenth and sixteenth centuries. Unquestioned specimens of ware of these dates are very valuable, single pieces selling for \$1,000 to \$10,000 or more. The finest collection in the world is that of J. P. Morgan, loaned to the Metropolitan Museum of Art, New York. See POTTERY.

MAJOR. See MUSIC; SCALE.

MAJOR, the title of a military officer above the rank of captain and below that of lieutenant-colonel. The major commands a battalion of infantry or artillery or a squadron of cavalry. The salary is from \$2,400 to \$3,000, dependent on length of service. See RANK IN ARMY AND NAVY.

MAJORCA, *ma jawr'ka*, an island in the Mediterranean Sea, belonging to Spain. It is the largest island of the Balearic group, is about fifty-eight miles in length and about 1,386 square miles in area, and is very irregular in shape and deeply indented. The west

and north coasts, which look towards Spain, are steep and lofty, but in other directions, and particularly on the east, the coasts are low and shelving. The island is generally fertile, producing, besides large crops of cereals, hemp, flax and fruits. Silk is also raised. The pastures are rich and maintain large numbers of cattle, and the fisheries on the coast are valuable. Several railways traverse the island. The chief town is Palma. Population, 1930, estimated, 263,000.

MAJOR-GENERAL, the title given to a military officer of commanding rank. In the United States army it is usually the highest commission in the service; only in war time are the higher ranks of lieutenant-general and general designated. In war a major-general commands a division or a field army; if the latter, a brigadier-general (next lower in rank) commands a division. The salary of a major-general is \$8,000, with certain additional allowances. See RANK IN ARMY AND NAVY.

MAKAW', a small tribe of Indians who live near the entrance to Puget Sound. They are skilful and daring fishermen and boatmen and in former times were warlike in nature. The women weave beautiful baskets. Unlike other Indians, the men have beards. The Makaws live upon a small reservation and are fairly civilized. They number fewer than 400.

MALACCA, *malak'kah*, STRAIT OF, the channel between the Malay Peninsula and the island of Sumatra. In length it is a little over 500 miles, and in width it varies about thirty miles to 250 miles.

MALACHI, *mal'a ki*, the last of the twelve minor prophets of Israel. The book which bears his name is the last one of the Old Testament. It is supplementary to the writings of Ezra and Nehemiah, and was written about 420 B. C. The word *Malachi* means *messenger of Jehovah*, and by some is thought to be a title rather than a personal name.

MALACHITE, *mal'a kite*, a carbonate of copper, of a dark, emerald-green color. The finest specimens are obtained from Siberia and Arizona, but it is found in many places all over the world. Fibrous malachite, when finely pulverized, is used as a paint; massive malachite is made into boxes, knife-handles, table-slabs and other ornamental articles and takes a beautiful polish.

MALAGA, *mah'lah gah*, SPAIN, a seaport on the Mediterranean Sea, in the extreme

southern part of the country, sixty-four miles northeast of Gibraltar. It is the capital of the province of Malaga. The city is a favorite health resort, as the climate is uniformly mild. The old portion of the city, which lies around a steep hill crowned by a medieval castle, is unattractive and unimproved, but the newer parts have several handsome avenues, including a beautiful promenade near the harbor. The most prominent structure in the city is the cathedral. Malaga carries on an active export trade in raisins, lemons, grapes, olives and olive oil, wine, almonds and esparto grass, and there are a number of manufacturing establishments, including several large iron foundries. Malaga was a flourishing city under the Romans, and its long occupation by the Moors left distinct marks in the older parts of the town. Population, 1932, 195,280.

MALARIA, *ma-la'ri-a*, an infectious disease known also as *ague*, *marsh fever* and *chills and fever*. It is caused by an animal parasite belonging to a class of protozoa (which see). This parasite is introduced into the blood through the bite of the *Anopheles* mosquito, and the problem of preventing malaria is therefore a matter of sanitation. The name is Italian for *bad air*, and was originally applied because it was believed that the disease was caused by poisonous air from marshes. Malaria was formerly a dreadful scourge in tropical regions, but in sections cleared of the *Anopheles* mosquito it has been wiped out. The extermination of this mosquito in the Canal Zone was one of the tasks of the sanitation department of the United States army during the construction of the Panama Canal, under Surgeon-General Gorgas.

An attack of malaria generally goes through three stages: first, headache and chills, then fever, and lastly, the sweating stage. These attacks last several hours, pass off, and recur again at intervals of from one to four days. The only specific known to cure malaria is quinine. Persons exposed to the bite of the mosquito have been kept from acquiring the disease by doses of this drug.

Related Articles. Consult the following titles for additional information:
Gorgas, William C. Panama Canal
Mosquito

MALAY' ARCHIPELAGO, also known as the Indian or Eastern Archipelago, the great group of islands situated to the southeast of

Asia and washed on the west by the Indian Ocean and on the east by the Pacific Ocean. The archipelago lies, approximately, between the parallels of 11° south latitude and 17° north latitude. Within these limits lie some of the largest and finest islands in the world, including Borneo, Sumatra, Java, Celebes and the Philippines. The islands are generally fertile and are covered with a luxuriant vegetation; they produce all kinds of tropical products in abundance. Many of them contain volcanoes. The chief native race is the Malayan. A large portion of the archipelago is under the rule of Holland, and is known as Netherlands Indies (formerly Dutch East Indies).

MALAY PENINSULA, a long, narrow strip of land extending in a southeasterly direction from the southeastern coast of Asia. It is about 850 miles in length, and from forty-five miles to 200 miles in width. On the south it is separated from the island of Sumatra by Malacca Strait. The China Sea washes its eastern shores, and the Indian Ocean its western. Politically the peninsula is divided between Siam and Great Britain. See STRAITS SETTLEMENTS; SINGAPORE.

MALAY RACE, or **BROWN RACE**. See RACES OF MEN.

MALDEN, *maul'den*, MASS., a suburb of Boston, five miles distant, on two divisions of the Boston & Maine Railroad and on the Malden River. It is an important manufacturing center, with more than 600 establishments and almost fifty different industries. The chief products are rubber, boots and shoes, shoe lasts, medicines, leather, paper, fiber and knit goods, furniture and other articles. The city has a Y. M. C. A., four libraries, a home for the aged and two hospitals. The place was settled in 1641 and remained a part of Charlestown until 1649. It was chartered as a city in 1881. Population, 1920, 49,103; in 1930, 58,036, a gain of 18 per cent.

MAL'DIVE ISLANDS, a chain of coral islands in the Indian Ocean, 400 miles southwest of Ceylon. The chain is composed of twelve clusters of atolls (see ATOLL). The larger islands are covered with trees, chiefly palm, and produce fruits, various kinds of edible roots and millet. All kinds of fish are found about the islands, and the inhabitants carry on a considerable trade with Bengal, Ceylon and the Malabar coast. An elected sultan rules over the islands, which are in-

habited chiefly by people of mixed Arab and Singhalese blood, who are Mohammedan in faith. The islands are under the protection of Great Britain. Population, about 70,000.

MALFEASANCE, *mal'fē'zans*, a wilful illegal act on the part of an official. It differs from *misfeasance* in that the latter refers to an act wrongfully and injuriously done in a lawful manner, or doing a lawful thing in an unlawful manner. Malfeasance in office, if proved, may subject the guilty person to removal from office and even to criminal prosecution.

MALICE, *mal'is*, in law, a definite design or intention of doing mischief to another, called also *malice prepense* or *malice aforethought*. The former relates to prearranged design, and not to mischief committed by reason of impulsiveness when opportunity is offered. *Malicious mischief* is the committing of an injury to public or private property from sheer wantonness. This offense is punishable with great severity. The law presumes malice in the very commission of the act; so it lies with the party indicted to rebut the presumption of malice or sufficiently to explain the act. See MURDER.

MALINES, *ma leen'*, or **MECHLIN**, *meK'lin*, BELGIUM, a city on the River Dyle, formerly celebrated for its exquisite lace, known as *Mechlin*. In a sense Malines is the religious capital of Belgium, as it is the residence of the only archbishop of the country. It is situated fourteen miles southeast of Antwerp, and suffered the same fate as that city in the second month of the World War, falling into the hands of the Germans; it suffered much damage through bombardment. Malines was a city of fine squares and public buildings, beautiful gardens and well-paved streets. Its beautiful Saint Romauld's Cathedral dates from the sixteenth century. The manufactures of Malines include woolen goods, hats, carpets, tapestries and furniture. Population, 1934, 61,757.

MALLEABILITY, a property of matter by virtue of which it can be hammered or rolled into sheets. Malleability is confined almost entirely to metals, and there are but few metals that are not malleable. Those possessing this property in the highest degree are, in the order named, gold, silver, copper, platinum, palladium, iron, aluminum, tin, zinc and lead. See GOLD.

MALLOW, the common name of a family of plants which secrete a mucilagelike sub-

stance. Included in this group are the hibiscus, hollyhock, cotton plant, marsh mallow, common mallow and others. The common mallow is a widely diffused species with reddish-purple flowers, which on drying become blue and yield their coloring principle both to water and alcohol.

The dwarf mallow is a common weed in America. Its stems, which are short, simple and spreading, rise from a long, deeply buried root. Its leaves are of a handsome, round, heart-shaped form, somewhat lobed and scalloped on their edges; the flowers are white, violet-white or purplish, and the fruits are flat and circular. The musk mallow has handsome, deeply cut leaves, which diffuse a pleasant, musky odor.

MALMO, *mahl'mö*, SWEDEN, capital of the prefecture of Malmöhus, and third largest city in the kingdom. It is situated on the Sound, opposite Copenhagen, with which there is ferry connection. Malmö is the terminus of eight railway lines, and has steamship connection with many European cities. The chief buildings are a city hall, which dates from the sixteenth century, the governor's residence and several old churches. An old citadel, now used as a prison, was the scene of the captivity of the Earl of Bothwell, husband of Mary Stuart. The manufactures are considerable and consist chiefly of iron, cottons, tobacco, gloves, brandy, chocolate and cars. Population, 1934, 132,090.

MAL'ORY, or **MALLORE**, THOMAS, Sir, an English author, about whom little is known, save that he lived in the latter half of the fifteenth century. He is famous as the author of the *Morte d'Arthur*, which contains the stories of Arthur and the Round Table which Tennyson afterward rewrote in verse in the *Idylls of the King*. These tales were probably translated into English from old French romances, and they form the first important English romance in prose.

MALPRACTICE, *mal prak'tis*, improper treatment of a patient by a physician, with injurious results. The patient and his family place confidence in the practitioner; if he feels incompetent to meet an emergency he must employ a physician better qualified or retire from the case. If a patient is injured through his bungling operation he becomes liable for damages.

MALT, *mawlt*, grain, usually barley, steeped in water and made to germinate. The starch of the grain is thus converted into

sugar, after which it is dried in a kiln and then used in the brewing of porter, ale or beer, and in whisky distilling. One hundred parts of barley yield about ninety-two parts of air-dried malt. See BEER; BREWING.

MALTA, *maw'l'ta*, an island in the Mediterranean Sea, belonging to Great Britain. It is the same island as that mentioned in *Acts* under the name *Melita*, upon which Paul sought refuge when shipwrecked. Malta is about fifty-eight miles south of Sicily and 180 miles from the nearest point in Africa. Valletta, the capital, is eighty-three miles southwest of Syracuse (in Sicily) and 991 miles southeast of Gibraltar. London is 2,298 miles distant. Malta is seventeen miles long and has an area of 91.5 square miles. It is chiefly important because of its strategic position. Valletta, which has an excellent harbor, is the base and resort for repair of the British fleet in the Mediterranean, and is one of the most important ports of call in the world, over 2,000 ships entering and clearing the harbor each year.

The island is for the most part low, the highest elevation not exceeding 845 feet. Though there are no rivers; springs are numerous, and the soil is very fertile. Potatoes, oranges, lemons, mandarines, onions and corn are the chief agricultural products; cotton is grown on a small scale. Farming is the most important industry, and cotton goods and filigree the leading products of manufacture. The people, who are industrious and frugal, speak a language believed to be derived from Arabic and Carthaginian. Italian and English are spoken by the commercial and educated classes, and both these languages are taught in the public schools. Malta was annexed to the British Empire in 1814. The government is administered by a governor and an executive council. Population, census 1931 (civil), 241,621.

MALTA, KNIGHTS OF. See JOHN, KNIGHT OF SAINT.

MALVERN HILL, BATTLE OF, an important battle of the Civil War, fought near the James River, at Malvern Hill, Va., July 1, 1862, between the Federal Army of the Potomac of about 80,000 men, under General McClellan, and the Confederate Army of Northern Virginia, about equal in numbers, under General Lee. It was the last of the "Seven Days' Battles" and practically terminated the Peninsula Campaign. The Federals held the hill, naturally a strong position,

and the Confederates were compelled to begin the assault. Though conducted with the greatest bravery and skill, the attack failed, and Lee's force was compelled to withdraw with a loss of fully 5,000. The loss of the Federals was about one-third of that number.

MAM'ELUKES, the former mounted soldiery of Egypt, consisting originally of Circassian slaves. As early as 1254 they became so powerful that they made one of their own number sultan, and this dynasty continued till the sixteenth century, when it was overthrown by Selim I. They suffered severely in opposing the French at the end of the eighteenth century, and in 1811 Mehemet Ali caused a general massacre of them throughout Egypt.

MAMMALS, the highest class of the vertebrates (backboned animals) and the most important class of the animal kingdom. In all excepting the lowest orders the young are brought into the world alive and feed themselves upon the mother's milk; but in some of the lower orders the young are not fully developed when born and are carried and fed by the mother. The higher we ascend the scale of life, the longer is the period through which the young are more or less dependent upon their parents. No animals outside the mammalian group suckle their young, and the class name is derived from the Latin word for *teat*.

The skin of mammals is always covered more or less with hairs, which are found in many forms, from the finest wool to large, coarse bristles and even spines. The skeleton is quite uniform in essentials, and in most points it agrees with that of man. The skull forms a single piece, composed of bones fixed together, to which is articulated a lower jaw. The skull rests upon the vertebral column, to which limbs, never more than four in number, are attached. The fore limbs are invariably present, but the whales and some other mammals have no hind limbs, or they appear only in rudimentary form. Most mammals have teeth, but they appear only in embryo in the whales and are entirely absent in the anteater and some other forms. The muscles of mammals are well-developed and perfect, resembling the birds in this respect. The diaphragm, which divides the body cavity in two, is peculiar to mammals. Air is breathed directly into the lungs, even by the whales and other water-inhabiting animals. All

nave warm red blood, which is driven by a four-chambered heart to all parts of the body through vessels called arteries, and which returns through another set of tubes to the lungs for purification. The anatomy of all mammals is so similar to that of man that the student is referred for greater detail to the separate articles in this work descriptive of the organs of man.

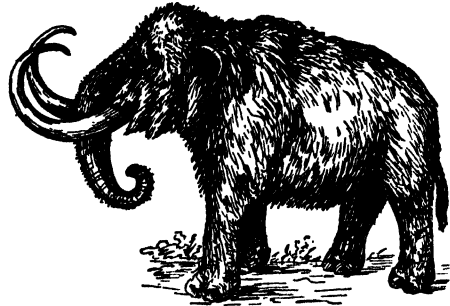
No mammals existed in New Zealand nor the Polynesian Islands until they were introduced by man. The marsupials, or animals which carry their young for a time in pouches, are confined to the Australian region, and the one genus opossum to America. Otherwise mammals are distributed widely in all parts of the world. Mammals are so well adapted for life under varying conditions that they have been carried from their native haunts, and concerning the original home of many we now have no information. The apes, monkeys and those mammals which are most closely related to man in structure inhabit the tropical or subtropical regions. The character of mammals seems to be largely dependent upon their food and surroundings. Those which live upon other animals are fierce and active and highly intelligent, living comparatively solitary lives. On the other hand, the vegetable-eating mammals are comparatively timid and often herd together; though many bear weapons of defense, most of them trust to their fleetness or to their ability to conceal themselves in order to escape from their enemies. Of course many mammals combine vegetable and animal food in varied proportions.

Related Articles. Consult the following titles for additional information:

Carnivora	Marsupials	Ungulates
Cetacea	Primates	Vertebrates
Man	Rodentia	Zoölogy

MAMMOTH, a species of extinct elephant, the fossil remains of which are found in Europe, Asia and North America. Geologically speaking, the mammoth dates from before the Glacial Period, which it survived, and lived into the earlier portion of the human period. Its bones and large curved tusks have been found in great abundance in Siberia. An entire carcass, which had been preserved in the ice, was discovered toward the close of the eighteenth century on the banks of the River Lena, in such a perfect state that the flesh was eaten by animals. The skin was perfectly preserved and was clothed with a furry wool of reddish color,

interspersed with black hairs. The skeleton and other parts of this animal were removed



MAMMOTH

to the Royal Museum of Petrograd. Another large specimen is preserved in the Chicago Academy of Sciences.

MAMMOTH CAVE, the largest known cave in the world, situated in Kentucky, near Green River, about eighty miles southwest of Louisville. It is one of a series of large caverns, formed in limestone rock which extends over an area of about 8,000 square miles, including portions of Kentucky, Tennessee and Indiana. The cave is about ten miles in diameter, and passageways aggregating more than one hundred miles in extent have been explored. The main cave is three miles long and from 40 to 175 feet in width, and in some places it is 125 feet high. The largest room, known as the Chief City, is oval in form, 541 feet long, 287 feet wide and 125 feet high. It is so called because it contains a number of Indian relics. In it were once held the council meetings of the Indians.

There are numerous other very interesting rooms, among which is the Star Chamber, a dome with a lofty ceiling of black rock, dotted with snow-white crystals of gypsum. These, when seen by reflected light, glisten like stars. The cave contains a number of rivers and small lakes. The largest, Echo River, is about three-fourths of a mile long and obtains its name from the wonderful echoes produced in the portion of the cave through which it flows.

As far as explored, there are five altitudes, or levels, and from the pit descending to the lowest of these a number of passageways have been discovered. These passageways undoubtedly lead to other chambers of great interest. The rivers contain numerous blind fish, and blind grasshoppers, beetles and other insects are found in the cave. Mammoth Cave

was discovered in 1809 and was first brought to general attention through large deposits of saltpeter found there and used for the manufacture of gunpowder during the War of 1812. The Mammoth Cave area has been taken over by the government, and will be erected into a national park.

MAN, the most highly organized being in the animal world. Though many attempts have been made to classify man as entirely separate from the rest of the animal kingdom, yet the more recent studies show him physically to belong to the highest family, in the group of apes and monkeys. But in mental endowment man ranks far above the highest of the apes. Again, he walks erect upon his feet and uses his hands solely for the purpose of taking and holding things; the bones of his face do not project forward, but rather downward, and are immediately below his brain; he has much greater cranial capacity than any other animal, and the convolutions of his brain are far more numerous and complex; his teeth are arranged close together; his hair covers only restricted areas of the body, and in various other minor ways man shows his difference from the apes.

Man possesses a reasoning mind and has a moral sense of right and wrong; he possesses an articulate language, by which he can communicate his thoughts readily—gifts which no other animal ever possessed. The gorilla, orang-outang and chimpanzee most closely resemble man, the latter differing less than any of the others.

Where man originated or how he became distributed over the earth are questions which no one can settle. Darwin believed that he was directly descended from some form of anthropoid ape now extinct and that all present races have come from one parent stock. Wallace believes a portion of this doctrine, but thinks that man has been especially endowed by his Creator with a high, controlling intelligence. Other great scientists believe that the race has been developed from separate beginnings and deny the supernatural creation of mind or soul.

Related Articles. Consult the following titles for additional information:

Age of Man	Geology	Vertebrates
Evolution	Mammals	

MAN, ISLE OF. See ISLE OF MAN.

MANAGUA, *mah nah'gwah*, a town in Central America, capital of the republic of Nicaragua since 1855, on the shore of Lake Managua. It is connected with Granada

and with Isla de Limon, on the Pacific, by rail. It was rebuilt after an earthquake in 1931. Population, 32,536.

MANAOS, *mah nah'ohs*, BRAZIL, a beautiful, modern city on the east bank of the Rio Negro, ten miles from its junction with the Amazon, 850 miles from Belem (or Para) and 3,800 miles by steamer from New York City. It has many handsome public buildings, botanical gardens and parks, a public library, a museum, etc. Good waterworks, an electric lighting system and street cars are among the public improvements. Manaos is the capital of the state of Amazonas. It lies on a harbor which can accommodate large ocean vessels, and is a thriving center for the export of rubber. A United States consular agent has his residence in Manaos. Population, 1920, 75,704; 1933, 87,936.

MANATEE' or SEA COW, an animal which resembles the dugong (which see), found on the coasts of South America, Africa and Australia. It frequents the mouths of rivers and feeds on algae and such land vegetation as it can reach at high tide. The animal is assisted in feeding by a peculiar upper lip, which is cleft in two and furnished with strong bristles. It has no hind limbs, and the fore limbs, or swimming paws, have nails, by means of which the animal drags itself along the shore. Manatees are large, awkward animals, attaining a length of from eight to twenty feet. The skin is grayish-black, and is sparsely covered with hairs. The flesh and oil are valuable.

MAN'CHESTER, ENGLAND, fourth in size among its cities and one of the most important manufacturing centers in the world. It is a municipal and parliamentary borough and inland port of Lancashire, on the Irwell River, thirty-two miles northeast of Liverpool and 164 miles northwest of London. A ship canal, connecting it with the Mersey, enables the largest ocean steamers to enter the heart of the city (see below). On the west side of the Irwell is Salford, connected with Manchester by numerous bridges and considered as virtually a portion of the city. Manchester has many important and striking public buildings and many fine streets. The center of the town is largely occupied by immense piles of warehouses and offices, while factories and other manufacturing works are chiefly in the outskirts. Among the principal public buildings are the town-

hall, or municipal building, in the Gothic style, one of the finest modern buildings in England; the Assize Courts, also a fine specimen of modern Gothic; the Royal Exchange, the new buildings of the Victoria University; and the Free Trade Hall, a building which has a seating capacity of 4,000. In this hall President Wilson addressed an audience of working men in December, 1918.

The most noteworthy ecclesiastical buildings are the cathedral, a fine specimen of Perpendicular Gothic, built in the early fifteenth century, and the Church of the Holy Name. The chief educational institution is Victoria University. Chetham's Hospital was founded under the will of Humphrey Chetham for the education of poor boys. Attached to the institution is a library of 40,000 volumes, the first free library in Europe. Among the public monuments, the most noteworthy is the Albert Memorial, in front of the townhall.

The chief manufacture of Manchester is cotton, but woolen and silk fabrics are also produced, as well as metal manufactures and all kinds of machinery. About 700 industries are represented in Manchester. The history of the city is legendary down to the tenth century, when it was devastated by the Danes. In the twelfth century the woolen manufactures began to develop, and in 1301 the place received municipal liberties and privileges. During the civil war the town suffered much at the hands of both parties. The introduction of machinery in cotton spinning toward the end of the eighteenth century gave power and direction to the trade of modern Manchester, and its progress since has been extraordinarily rapid. A temporary check resulted from the Civil War in America, which led to a cotton famine in 1862, causing the deepest distress in South Lancashire. Population, 1921, 730,551; 1931, 766,333.

Manchester Ship Canal, a canal extending from Manchester, England, to the estuary of the Mersey River, at Eastham. It is thirty-five and one-half miles long, twice as wide as the Suez Canal, and has a depth of twenty-six feet. It was ready for traffic on January 1, 1894, and was formally opened by Queen Victoria on May 21. The construction of this canal cost \$75,000,000. Through it the largest ocean steamers enter the heart of the city, which has six miles of wharfage and 100 acres of dock accommodations.

MANCHESTER, N. H., one of the county seats of Hillsboro County, Nashua being the other. It is the largest city in the state, is fifty-six miles northwest of Boston, on the Merrimac River at the mouth of the Piscataquog River, and on the Boston & Maine and Canadian Pacific railroads. The city contains a public library, a training school for teachers, Saint Anselm's College, Saint Mary's Academy, an art gallery, and a state industrial school. Other prominent structures are a Federal building, a courthouse and a Roman Catholic cathedral. Among the manufactures, boots and shoes are important, though cotton cloth is by far the leading product, more than thirty mills being engaged in its manufacture. Other manufactures include knitting machines, fertilizer, hosiery, paper, woolen goods, needles, lumber and furniture. The output of all manufactured goods is nearly \$1,000,000 every week. The place was settled by the Scotch-Irish in 1722, and was known under different titles until 1810, when it received its present name. It was chartered as a city in 1846. There is an airport and an interurban railway. Population, 1930, 76,834.

MANCHUKUO, *mahn' jo' kwo'*, formerly Manchuria, a new empire established northeast of China, yet claimed by the Chinese as a part of their country but taken in September, 1931, by Japan at the point of the sword. On the pretext of protecting Japanese nationals, Japan entered the country, though Japanese then numbered in all Manchuria scarcely 200,000 in a population of 29,606,000 (in 1932). This act followed unsuccessful efforts to secure peaceful entrance through treaty rights obtained from China through coercion. For several months there was severe fighting.

The Chinese governor at Mukden was deposed and three large provinces were occupied by the invaders, to which was later added Jehol; when occupation was complete, at least for a time, the southern limits of the new state extended almost to China's ancient capital, Peking (now Peiping). The new authority removed the capital from Mukden to Changchun, and proclaimed the government as the republic of Manchukuo (*kuo* means *state*). Henry Pu-yi, once child emperor of China, was named as President. Late in 1933, with power consolidated, the republican form was abandoned; Pu-yi was proclaimed emperor, and was crowned with

elaborate Eastern ceremonies, in April, 1934, at which time he adopted a dynastic name, Kang-teh.

All of these events occurred over the protests of China, the Great Powers, and the League of Nations. Japan endeavored to smother this opposition and criticism, and after an international commission had reported adversely, it announced its withdrawal from the League rather than be swerved from its predetermined course.

Manchuria was the original nome of the Manchus; from here they descended upon China nearly 300 years ago, conquered the country, and established the Manchu dynasty upon the throne. Thereafter China was ruled by the Manchu line until the republic overthrew the monarchy in 1911. The Japanese have taken the last Manchu ruler of China and have placed him upon a puppet throne in the ancient home of his people, where few Manchus are left to-day.

Manchukuo is a fertile agricultural area. It is also rich in minerals; an estimated billion and a quarter tons of coal, great deposits of iron (much needed by Japan), gold, silver, and lead, and indications of oil deposits are among the riches of the region. The area of Manchukuo is 429,000 square miles.

MANDALAY, INDIA, the former capital of Burma, is situated on the left bank of the Irawadi, 350 miles north of Rangoon, with which it is connected by railway. Since 1885 Mandalay has been the capital of Upper Burma. A destructive fire in 1892 made it possible to rebuild a large portion of the city, and in the rebuilding, under British direction, the town was greatly improved. The area covered is about six square miles, the central portion being a picturesque walled town now used as a military station. The chief buildings are the palace of the former king, the government house and the hall of justice. The city also contains a number of temples, pagodas and monasteries, and it is celebrated for its grand bazaar, which is a market containing miscellaneous collections of wares. The most important industry is silk weaving. Kipling used the city effectively for local color in his popular ballad *Mandalay*. Population, 1931, 147,932.

MANDA'MUS. See WRIT.

MAND'AN, formerly a large tribe of Indians living in North Dakota. Few now re-

main after years of great disasters, which were, however, met with remarkable courage. The Mandans were driven about by the Sioux; smallpox depopulated their villages, and the tribe was almost forgotten. Yet a few retained faithfully their customs and habits, and, living clean lives, kept the tribe alive. In their primitive mode of living they stretched buffalo skins over a circular wooden framework and made awkward tub-like boats, which, however, they handled with much skill. They tattooed their breasts, and in some of their ceremonies they inflicted terrible torture upon themselves. In complexion they are very light, and albinos are frequently found among them.

MANDARIN, *man da reen'*, a Chinese word adopted from the Hindu, meaning *counselor*. It referred to the governing class in China under the empire. There were nine grades of mandarins, the exact status of each being designated to the public by the size of an ornamental button worn on his hat.

MANDATES. A mandate, in international usage, is a charge, as to a nation, authorizing the governmental administration and development of conquered territory, given by the League of Nations, to which the grantee is responsible. Territories acquired from Germany and her allies in the World War were held under mandate as follows:

By Great Britain: Palestine, Tanganyika, Southwest Africa, Cameroon (part), Togoland (part), New Guinea, Western Samoa and Nauru.

By France: Syria and Lebanon, Cameroon (part), Togoland (part).

By Japan: The Pacific Islands north of the equator.

MAN'DEVILLE, JOHN DE, Sir, the name adopted by the compiler of an extraordinary book of travels, originally written in French, between 1357 and 1371. An English version was made from the French manuscript in the latter part of the fourteenth century. That part of the book which treats of the Holy Land may be a record of the author's experience, but the greater part is compiled from the accounts of various other travelers.

MAN'DOLIN, a musical instrument with a shell-shaped body, composed of strips of different kinds of wood glued together. It has a neck like a guitar. There are from four to six double strings, which are struck by a plectrum in the right hand, the fingers of the left stopping the strings on the fretted

'fingerboard. A long note is produced by rapid striking of a single note many times in succession, producing a peculiar, tremulous tone. The instrument is of Italian origin and is of great antiquity.

MAN'DRAKE, a genus of plants belonging to the nightshade family, with large tap-roots which bear a fancied resemblance to the human figure. In olden times the superstitious believed the mandrake would shriek when torn from the ground. The white bell-shaped flowers grow on very short stems, and the root has narcotic qualities. Two species are found in Europe and the Orient.

MAN'DRILL, a grotesque baboon of large size and ferocious disposition, found in Western Africa. Full-grown males measure about five feet. A crest of black hair crowns the head, the beard is orange-yellow, and the animal has red and blue stripes on its cheeks. The tip of the nose is bright red. See **BABOON**.

MANET, *mah na'*, EDOUARD (1832-1883), a French painter, founder of the Impressionist School (which see). He was born in Paris, and as an eager young artist spent six years in the Parisian studio of Thomas Couture. Manet first exhibited in the French Salon in 1861 with his *Spaniard Playing the Guitar*. His conviction that the painter should portray what he sees, regardless of accepted canons of art, inspired ridicule and even abuse, and the Salon often refused to hang his pictures. Later, he overcame much of this prejudice, and to-day his paintings may be seen in many of the leading galleries. Among his works are *Olympia*, *Christ Mocked*, *Breakfast on the Grass*, *Bon Bock*, *Boy with a Sword* and portraits of Proust, Zola and Clemenceau.

MANGANESE, *man'ga neese*, a hard metal of a whitish-gray color, occurring in nature in iron, lead and silver ores, various mineral waters and in vegetables and grains. This metal is not used by itself, but it forms alloys with copper, iron, zinc, lead and other metals, and is of especial value in the manufacture of steel, to which it adds elasticity and hardness. Manganese compounds are also valued in the manufacture of dry batteries, flint glass and pottery.

MANGE, *maynj*, a skin disease which afflicts dogs and cattle and, under the name of *scab*, or *scabies*, sheep. It is due to the presence of a small mite, which burrows beneath the skin. The disease appears in the

form of pimples, the animal suffers severely and in a short time the skin becomes covered with scabs. The disease is contagious and can be conveyed in numerous ways. The most successful treatment consists in dipping the animal in solutions which will destroy the insect. These are usually solutions of tobacco and sulphur, lime and sulphur or carbolic acid. Preparations containing mercury and arsenic or other poisonous materials should not be used. In most regions where the disease is prevalent, farmers combine and construct dips, which are small tanks into which the animals can be plunged.

MAN'GO, the name of a genus of ever-green trees, which are natives of India and the Malay Peninsula, though they have been introduced into numerous tropical countries. In India there are nearly 150 varieties. In its native state the common mango grows to a height of about forty feet and has a spreading top with dense foliage, the leaves being from six to eight inches long. The flowers are



THE MANGO

small, reddish-white or yellow and are borne in dense clusters. The fruit is kidney-shaped and varies considerably in size and color with different species. The best varieties of fruit are highly prized for eating. Some are sweet, and others are slightly acid. The unripe fruit is frequently used for sauces and pickles. By cultivation the mango has been extended to most of the West India Islands and to Florida and California.

MAN'GROVE, a genus of trees or shrubs which grow in tropical countries along the muddy beaches of low coasts, where they form

impenetrable barriers for long distances. They throw out numerous roots from the lower part of the stem and also send down long, slender roots from the branches, like the Indian banyan tree. The seeds germinate in the seed vessel, the root growing downward till it fixes itself in the mud. Mangrove trees thus are responsible for shore lines being extended into the water, for their roots catch flying particles and hold mud washed up by the waves. The fruit of some species is said to be sweet and edible, and the fermented juice is made into a kind of light wine.

MANHATTAN ISLAND, N Y., an island at the mouth of the Hudson River, between that river and East River, constituting the Borough of Manhattan, New York City. It is separated from the mainland on the north and northeast by the Harlem River. The maximum length of the island is $13\frac{1}{2}$ miles, greatest width, $2\frac{1}{4}$ miles; area, 22 square miles. It has a wharfage front of 10 miles. It was originally acquired by Dutch settlers, who gave its Indian possessors the equivalent of \$24 for it. To-day, excepting a small area in metropolitan London, Manhattan is more valuable than any other similar area on earth. See New York (City) for further description.

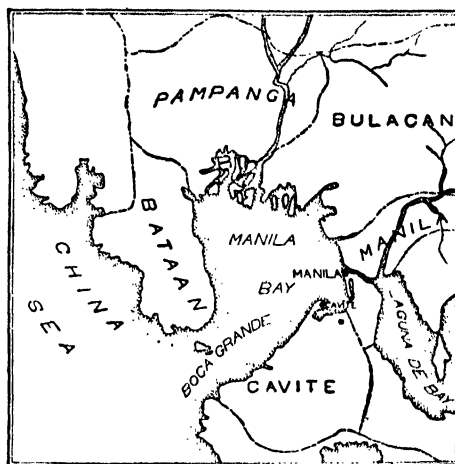
MANNHEIM, *mahn'hime*, GERMANY, the largest city in the former grand duchy of Baden, on the right bank of the Rhine, near its junction with the Neckar. The former grand-ducal palace, one of the largest buildings of its kind in Germany, is the most interesting building, and it contains a fine picture gallery and a library. The city has an extensive harbor and docks and is the chief commercial center of the upper Rhine. Among its industrial plants are many that manufacture electrical and gasoline motors and agricultural implements. Other important manufactures are celluloid, leather goods and railway supplies. Along the Rhine the city has constructed miles of modern docking facilities to care for its volume of commerce. Population, 1933, 275,960.

MANIA. See **INSANITY**.

MANILA, the capital of the Philippine Islands, is a city in which American enterprise and a typical Spanish civilization have met and been harmonized. Manila is situated on the western coast of the island of Luzon, at the head of Manila Bay and at the mouth of the Pasig River. It is 1,343 miles northeast of Singapore, 9,554 miles from

Liverpool, by way of the Suez Canal, and 6,238 miles from San Francisco. The original Spanish settlement, a quaint old place surrounded by walls, lies on the south bank of the Pasig; on the other bank are the suburban sections.

Intramuros, as the walled city is called, is still picturesquely Spanish, with its convents, monasteries, churches, public buildings and private homes reminiscent of the old régime. Directly across the river is Binondo, the commercial and industrial section of Manila,



MANILA AND VICINITY

in which electric street cars have replaced the slow-moving carabao of former days. Adjoining Binondo on the north is the suburb of the poorer classes, no longer a place of filth and disease, but clean and healthful. It has been made so by a good water supply and drainage and sewage systems. The upper classes live in San Miguel, an island formed by an arm of the Pasig. A spacious boulevard has been constructed along the bay shore, and on it are the new United States government buildings and a splendid modern hotel. At the head of the boulevard is the Luneta, a small park used as a promenade and pleasure ground. (For other details, see the article **TRAVELS IN DISTANT LANDS**.)

Manila harbor has been improved under American direction until it is now the best in that section of the Far East. The improvements include dredging of the harbor area and the construction of jetties and large steel wharves. The harbor is visited by steamships from ports on both sides of the Pacific and from islands in the ocean, rice, cotton goods, wine, metal goods, chemicals and

machinery being imported in large quantities. From Manila is shipped the bulk of the Filipino hemp crop, besides tobacco goods, sugar, coffee and dyewoods. A leading manufacturing industry is the making of cigars, in which thousands of workers, including women and children, are employed.

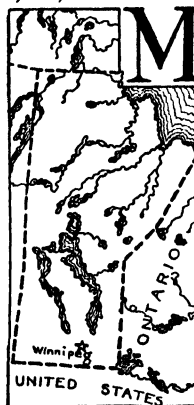
Manila was founded by Legazpi, the conqueror of the Philippine Islands, in 1571. It has frequently suffered from earthquakes, one of the most disastrous being that of 1863. The city was surrendered by the Spaniards to the American naval and military forces in the Philippines, August 13, 1898 (see **SPANISH-AMERICAN WAR**). At that time the Filipino insurgents were surrounding the city, and in the early part of 1899 they broke through the American lines which invested the city and burned a considerable portion of it. In August, 1901, the military government gave place to civil rule. The city is now under the commission form of government. Population, 1932, 341,000; of this number, 265,000 were Filipinos.

MANILA BAY, BATTLE OF, a naval battle of the Spanish-American War. It was fought in the bay at Manila, in the Philippine Islands, May 1, 1898, between an American fleet, under Commodore George Dewey, and a Spanish fleet of about equal strength, under Admiral Montojo, supported by land batteries. The American fleet, which, at the declaration of war, was in Chinese waters, had proceeded to the Philippine Islands and had entered the harbor at Manila during the night of April 30. At about 5:30 the following morning, a vigorous attack was begun against the Spanish vessels. This continued with brief interruption until 12:30 and resulted in the complete destruction of the Spanish ships and the silencing of the batteries. The Spanish loss was more than 600 killed and wounded, while the Americans had none killed and only six wounded. See **SPANISH-AMERICAN WAR**.

MANILA HEMP. See **HEMP**.

MANISTEE, MICH., the county seat of Manistee County, 140 miles northwest of Lansing, on Lake Michigan, on the Manistee River near Lake Manistee, and on the Pere Marquette and the Manistee & North Eastern railroads. There is a local airport. The city has a good harbor and ships considerable lumber, shingles and salt; however, fruit orchards are now taking the place of what was once a great lumber district. There

are foundries, furniture factories, tanneries and other works. The important buildings include a courthouse, a fine opera house, a Carnegie Library, an Elks' Temple and two hospitals. The place was settled in 1840 and was chartered as a city in 1869. The commission form of government was adopted in 1914. Population, 1920, 9,690; in 1930, 8,078, a decrease of 20 per cent.



MANITOBA, one of the central provinces of Canada. Before 1912 it was 73,732 square miles in extent, but in the latter year it was enlarged to an area of 251,382 square miles. It extends from the international boundary northward to Hudson Bay at the 60th parallel of latitude. Ontario is east, Minnesota and North Dakota are south, Saskatchewan is west, and on the north are the vast North West Territories. Manitoba had a population of 610,118 in 1927, which increased to 700,139 in 1931. Nearly a third of the total population is in the capital city of Winnipeg, which is now the fourth city in the Dominion; only Montreal, Toronto and Vancouver are larger.

Surface and Drainage. In the northeastern corner a section of the Laurentian Hills produces a broken and hilly country, somewhat higher than the surrounding region. The southern and central parts of the province are nearly level and are a continuation of the broad valley of the Red River of the North, found in Minnesota and North Dakota. The western border of this valley is formed by an escarpment, which marks the shores of the ancient lake of which the valley was the bottom. West of this escarpment the surface consists of rolling or undulating prairie, which increases slightly in elevation toward the western boundary. The higher swells here are known as the Riding and Duck mountains. In the northwestern corner these mountains are covered with heavy forests of pine.

The Red River of the North crosses the southern boundary a little east of the middle point and continues to Lake Winnipeg. Its chief tributary is the Assiniboine, which enters the province from the west. In the

northeastern part are found the Berens and the Pigeon rivers, while the northwestern section is drained by the Swan. All of these streams are small. Three large lakes occupy a portion of the north central part of the province. These are Lake Winnipeg, Lake Winnipegosis and Lake Manitoba. Of these, Lake Winnipeg is the largest, being 270 miles long and varying in width twenty to sixty miles. All of the lakes are shallow and their shores are low.

Climate. The climate is characterized by extremely cold winters, in which the thermometer may fall as low as 50° below zero, and short, hot summers; but the dryness of the atmosphere prevents these extremes from being felt to the extent that they would be in more humid regions. The rainfall averages about seventeen inches, but three-fourths of this occurs during the growing season; so, notwithstanding the limited annual precipitation, the country is well suited to agriculture.

Mineral Resources. The minerals and non-metallics mined include building stone, clay products, coal, copper, gold and gypsum. Other deposits include iron, mica, molybdenum, natural gas, peat, petroleum, salt, tungsten, zinc and lead. Striking discoveries of gold have been made near The Pas, on the Nelson and Hayes Rivers, at Flin Flon Lake, Schist Lake and Rice Lake.

Agriculture. The great valley occupying the central portion of the province is well suited to the growing of all crops that can be raised in a cool temperate climate, but because of the peculiar nature of its soil, Manitoba is especially adapted to raising the best varieties of spring wheat, and this crop ranks first among the cereals in average and value. Next in importance to wheat are oats, barley, flax and potatoes. Hay and forage crops are grown to a considerable extent, and the raising of live stock and dairying are fast becoming important branches of agriculture. The average crops are the following: wheat, 52,000,000 bushels; oats, 53,500,000 bushels; barley, 52,000,000 bushels; potatoes, 3,500,000 cwt.

Fisheries. The lakes and streams abound in fish, and the taking and exporting of whitefish, sturgeon, pickerel and other fish is an important industry. The total value of Manitoba fisheries in 1935 was \$2,220,000, chiefly from Lakes Winnipeg and Winnipegosis. The catch included whitefish, pickerel, tulibee,

pike, perch, sturgeon, mullet, goldeye, etc., marketed chiefly in the United States. In Northern Manitoba valuable fisheries await exploitation. On Hudson Bay, Manitoba has a coast line of 600 miles.

Transportation. There are nearly 4,300 miles of railroad in the province. The Canadian Pacific railway crosses it from east to west and has numerous branches extending in various directions from Winnipeg. The Canadian National Railway likewise crosses the province on its transcontinental route. A branch of the Northern Pacific railroad enters Manitoba from Minnesota and extends to Winnipeg, thus forming connection with the trans-continental lines of the United States and with Saint Paul and Minneapolis. The Hudson Bay Railway connects Le Pas with Churchill, the new port on Hudson Bay. During high water the Red River and the Assiniboine are navigable, though since the construction of railways they are but little used. The Saskatchewan and its outlet, the Nelson, are navigable in stretches.

Plant and Animal Life. The central and southern prairie regions have few trees; they are found principally in the vicinity of lakes and along rivers. The northern and eastern parts of the province are rich in tamarack, spruce and pine, with scattering hardwood. The western section has more hardwood, such as the oak, elm and maple. There are four forest reserves—the Turtle Mountain (70,000 acres), the Porcupine (759,000 acres), the Duck Mountain (988,000 acres) and the Spruce Woods (143,700 acres). Most of the extensive lumbering operations are carried on in the region of conifers, north of the prairie region, and under strict government regulation.

The central and northern parts attract the trapper, for martens, minks and muskrats are abundant. The hunter finds in season duck, grouse, plover and the like. In the wild regions such large game as deer, moose, elk and caribou, abound; these are protected most of the year. There are great quantities of fish—whitefish, pickerel, trout and pike, principally—in the rivers and great lakes of the province.

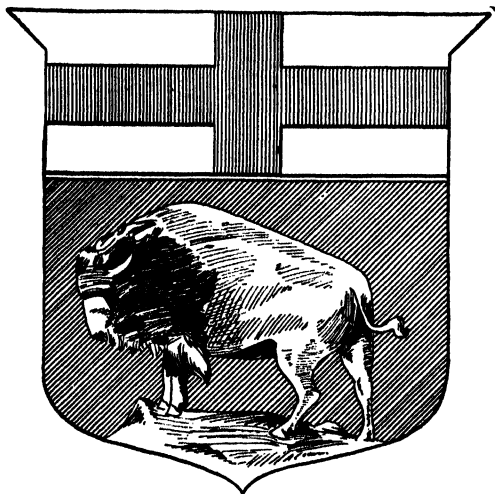
Manufactures. In 1931 the capital invested in manufactures was \$110,000,000. salaries and wages paid \$18,706,742 and value of products \$124,860,000. The leading industries included flour mills, meat packing, butter and cheese, cotton and jute bags.

Education. Manitoba was first among the provinces to set aside for future school funds two sections of land in each township; in this provision it followed the lead of the United States. Current school expenses are met by local and provincial taxation. There is a minister of education for the province.

At the head of the school system is the University of Manitoba at Winnipeg, in which city also is an agricultural college. There is one normal school at Winnipeg and another at Brandon.

Cities. There is but one large city in the province, and this is Winnipeg (218,785). Other cities are Brandon (17,082), Saint Boniface (16,305) and Portage la Prairie (8,597), as reported by the census of 1931.

Government. The government consists of a lieutenant-governor, appointed by the Governor-General and council of Canada for a term of five years, and a legislature of one house of fifty-four members, elected for five



COAT OF ARMS OF MANITOBA

The buffalo, which formerly roamed the plains of Manitoba, is chosen as the provincial emblem. Above is the cross of St. George the symbol of British rule. When colored properly the cross is red, on a silver background.

years. Women may vote, and may be elected to the provincial parliament. The common law of England prevails in Manitoba. The courts consist of a supreme court, with one chief justice and four associates, and inferior courts, for each county. Local affairs are managed by municipal councils.

History. The first settlement in Manitoba was the Selkirk colony on the Red River, a

Items of Interest on Manitoba

Manitoba lies nearly midway between the Atlantic and the Pacific coasts.

The word Manitoba is a contraction of two Indian words, *Manito* (the Great Spirit) and *Waba* (the "narrows" of the lake); this strait in Lake Winnipeg was a sacred place to the Crees, who were impressed by the sound of the wind rushing through the narrows.

The surface is chiefly a prairie region, but the river banks are fringed with trees, sometimes forming forests of considerable size.

The Manitoba forest reserves have an area of 3,600 square miles.

Aspen, maple, oak, elm and willow are the important varieties of trees.

Manitoba was the first province to set aside two sections of land in each township for school purposes.

The Manitoba Agricultural College at Winnipeg was first opened in 1906; its new buildings are estimated to cost \$1,000,000.

The provincial university stands at the head of the educational system.

The Dominion government maintains three fish hatcheries, two on Lake Winnipeg and one on Lake Winnipegosis; all three handle only white-fish.

There are forty-six Indian schools, with an average attendance of about 1,200 boys and girls.

The Indian population of the province is nearly 14,000.

Questions on Manitoba

What is the present area of Manitoba? When was the last change made in the provincial boundaries?

What is the origin of the word Manitoba?

What are the principal rivers?

Of what drainage system are they a part?

What is the highest point in the province?

What are the important native trees? Where are they found?

Name three of the principal mineral products.

MANITOBA



1, Fish Hatchery.
2, Winnipeg Postoffice.

3, Wheat Field.
4, Interior of a Flour Mill.

5, Lumber Mill.
6, Windbreak of Firs.

7, Live Stock and Poultry.

little north of the present city of Winnipeg. The whole section was called until 1870 the Red River Settlement. Founded in 1812 by the Earl of Selkirk, the colony struggled on for a few years in the face of great opposition from the Northwest Fur Company. In 1821 this company was absorbed by the Hudson's Bay Company, and for nearly fifty years the Canadian Northwest remained in the hands of the fur-traders. The only inhabitants were the *métis*, or half-breeds, who trapped and hunted most of the time. When the Northwest was transferred to the Dominion Government in 1869, the *métis*, fearing that their privileges would be withdrawn, resisted the influx of English settlers and rose in rebellion. They organized a republic, with Louis Riel as President. On the arrival of Canadian troops, however, Riel and his followers immediately fled. Meanwhile the Canadian Parliament passed a law making Manitoba a province, and a permanent government was organized in 1870, under its present name, but with only about one-third its present area. At that time its population was only about 25,000.

In 1908 the provincial government acquired the telephones; two years later a workmen's compensation law was passed. Since 1916 no language other than English has been legally employed in the schools.

Related Articles. Consult the following titles for additional information:

CITIES		
Brandon	Saint Boniface	Winnipeg
LAKES AND RIVERS		
Assiniboine	Red River of the	
Churchill	North	
Manitoba	Winnipeg	
Nelson	Winnipegosis	
HISTORY		
Hudson's Bay Com- pany	Riel, Louis	

MANITO'BA LAKE, a lake of Canada, situated in the province of Manitoba, southwest of Lake Winnipeg, is about 135 miles in length, about twenty-five miles in breadth, and has an area of 1,817 square miles. It receives the water of several lakes at its northern extremity, and at its southern it receives those of White Mud River. It discharges into Lake Winnipeg through the Daphin River, and is forty feet higher than Lake Winnipeg. It is an attractive region for sportsmen, for fish and game abound.

MANITOU, *man i too'*, COLO., a town of El Paso County, six miles northwest of Colorado Springs, at the base of Pike's Peak, 6,296 feet above the level of the sea. It is

known widely as a health and pleasure resort, because of its mineral springs and its beautiful scenery. The place has many canyons and falls, and Monument Park and the Garden of the Gods are here. Population, in summer, over 5,000.

MANITOULIN, *man i too'lin*, **ISLANDS**, a group of islands in Lake Huron, divided between the Canadian province of Ontario and Chippewa County, Michigan. Georgian Bay is separated from the main body of the lake by these islands, and they are separated from the north shore of Lake Huron by the North Channel. The largest island, Great Manitoulin (or simply Manitoulin), belongs to Canada. It is ninety miles long and from five to thirty miles in width. Cockburn Island, or Little Manitoulin, a round island about seven miles in diameter, also belongs to Canada. The only important one belonging to Michigan is Drummond Island, twenty-four miles long. Population of the group, about 6,000 more than one-sixth of whom are Ojibway Indians.

MANITOWOC, *man i toh wahk'*, WIS., the county seat of Manitowoc County, seventy-five miles north of Milwaukee, on Lake Michigan, at the mouth of the Manitowoc River, and on the Minneapolis, Saint Paul & Sault Ste. Marie and the Chicago & North Western railroads. It is connected by a boat line with the Pere Marquette and the Ann Arbor railroads, in Michigan. The town has considerable lake commerce, shipping large quantities of grain, flour, dairy products and leather. The industrial establishments include, also, cigar factories, aluminum-ware and canning factories, shipyards, planing mills, brickyards and machine shops. The city contains a county insane asylum, a training school for teachers and a Polish orphanage. It was chartered as a city in 1870. Population, 1920, 17,563; in 1930, 22,963, a gain of 30 per cent.

MANKA'TO, MINN., the county seat of Blue Earth County, ninety miles southwest of Saint Paul, at the confluence of the Blue Earth and Minnesota rivers, and on the Chicago Great Western, the Chicago & North Western, the Chicago, Saint Paul, Minneapolis & Omaha and the Chicago, Milwaukee, Saint Paul & Pacific railroads. It is in an agricultural region near valuable stone quarries. The principal manufactures are knit goods, cement, lime, candy, butter, lumber, flour, and foundry and machine shop prod-

ucts. A state normal school and Bethany College are here, and the city has an airport, a Carnegie Library, two hospitals, a fine courthouse, good schools, and a Catholic training school for teachers (nuns). The place was settled in 1852, was incorporated six years later, and was chartered as a city in 1868. The city is governed on the mayor-council plan. Population, 1920, 12,469; in 1930, 14,038.

MANN, DONALD, Sir (1853-1934), a Canadian railroad builder, was born at Acton, Quebec. He went to Winnipeg in 1879 and became a contractor for the Canadian Pacific Railway. The firm of Mackenzie, Mann & Co., was established in 1886 and has since taken a great part in the development of the west, especially through its construction of the Canadian Northern Railway, of which Sir Donald was vice-president. His work chiefly consisted in directing construction, in which he has a unique reputation for speed, efficiency and economy. He was knighted in 1911. See **MACKENZIE, WILLIAM**.

MANN, HORACE (1798-1859), an American educator who helped to establish the present common school system in the United States. He was born at Franklin, Mass. During his boyhood and youth he worked on a farm and attended a country school. In spite of his limited education, at the age of twenty he prepared himself for college in six months, studying with a private teacher, and in 1819 he was graduated from Brown University with high honors. In 1823 Mann was admitted to the Massachusetts bar, and began practice in Dedham. Though he attained success as a lawyer, his real interests lay in the advancement of social reform. His election to the lower house of the Massachusetts legislature in 1827, and to the state senate in 1833, gave him a practical opportunity to further his ideas. In 1837, while president of the senate, he signed a bill providing for a state board of education, the foundation stone of the present public-school system of the state. Mann was appointed first secretary of the board, and held the position twelve years. He began by publicizing the new system, publishing the *Common School Journal* and a series of annual reports, which exerted great influence in securing the changes that he desired. During his term of office he secured the establishment of the Massachusetts state normal school, the first in the United States, and

completely reformed the public-school system. His influence was felt in many other states. In 1848 Mann was elected to Congress to fill the vacancy caused by the death of John Quincy Adams, and there he vigorously opposed slavery. During the last seven years of his life he was president of Antioch College, Yellow Springs, Ohio, where he continued his work for social reform.

MANN, THOMAS (1875-), a novelist of such force that he is acknowledged as the greatest German writer of his period, was born in the city of Lübeck. His father was a senator in the old city-state of Lübeck, his mother a talented Brazilian. With her he moved to Munich after the death of his father, and for a time was employed in an insurance office. In Munich, probably Germany's literary center at the time, he was encouraged in his ambition to write. His first novel, *Gefallen* (1894), gave promise of ability, and he turned resolutely to literature. In 1901 he published *Buddenbrooks*, and this established his fame, for fifty editions were printed in ten years. Later books include *The Magic Mountain*, *Joseph and His Brothers*, *A Man and His Dog*, *Mario and the Magician*, *Children and Fools*, *Three Essays*, and *Bashan and I*. He was awarded the Nobel Prize in Literature in 1929.

MAN'NA. When the Children of Israel were journeying in the desert, according to the account in *Exodus* XVI and *Numbers* XI, they were fed with a substance which fell from heaven, to which the name *manna* was given. It consisted of small, round, white flakes which had a sweet taste. Each person gathered in the morning enough to last him through the day and no longer, for if it was kept over from one day to the next, it spoiled. On the day before the Sabbath, however, a double portion fell, and on that day it could be kept. When the Israelites entered Canaan, the falling of the manna ceased.

MAN'NING, HENRY EDWARD (1807-1892), a Roman Catholic prelate, born at Totteridge in Hertfordshire and educated at Harrow and at Balliol College, Oxford, and made a Fellow of Merton. He was a leader of the Tractarian party, but in 1851 left the Church of England and joined the Roman Catholic Church. After being ordained priest, he studied several years in Rome, founded the congregation of the Oblates of Saint Charles Borromeo at Bayswater, London, was made archbishop of Westminster in 1865 and car-

dinal in 1875. Manning worked for the advancement of the Church of England, for the improvement of the people in temperance and education, and wrote many articles and pamphlets on the Vatican Council, infallibility and the temporal power of the Pope. See OXFORD MOVEMENT.

MAN-OF-WAR, a term now nearly obsolete, but once current and referring to a war vessel. See WARSHIP; NAVY.

MANON, *ma nahN'*, JEANNE PHILIPON, MADAME. See ROLAND DE LA PLATIERE, MARIE.

MANOR, the economic and political unit developed in Europe during the Middle Ages. It comprised the estate, the lord and his family, the free tenants and the villeins or serfs. The lord was both administrator of his property and military and political head. The castle was the lord's residence and the meeting place for the manorial court. He collected profits, rents and also dues from the surrounding rural population. As a political official the lord coined money, raised taxes and controlled monopolies such as milling and baking.

With the decline of feudalism (see FEUDAL SYSTEM) the manor went out of existence as a legal unit, but survived as part of an economic system in which large estates were parceled out to tenants. The mansions of great landowners in England are still called manor houses. In New York, during the colonial period, the patroons and their tenants established a relationship similar to that of the lord of the manor and his dependents. Many of the old manor houses of the Hudson River Valley are memorials of the patroons. See PATROON SYSTEM.

MAN'SARD ROOF, a roof formed with a break in the slope, so that each side has two planes, the lower one approaching more nearly to the perpendicular than the upper. This kind of roof permits of an upper story in place of an ordinary attic. It received its name from François Mansart, a famous French architect, who first used this type.

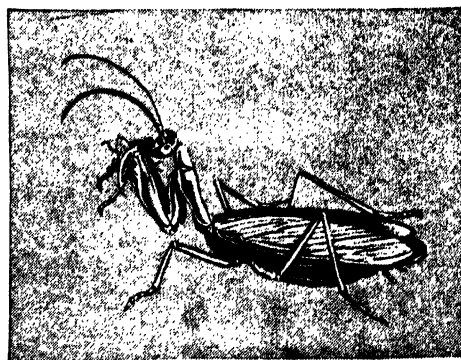
MANSFIELD, RICHARD (1857-1907), an American actor who for many years was considered a leader in his profession. He was especially effective in rôles requiring a sympathetic understanding of the spiritual nature of the characters portrayed, and no one surpassed him in the care and thought he gave to the details of character portrayal. Mansfield was born on the island of Helgo-

land. His father was a London merchant, and his mother was an opera singer. The boy began the study of painting in London, but lacked money to finish his course, and at the age of seventeen went to America. On a subsequent visit to England he joined a company of strolling actors who were giving Gilbert and Sullivan operas, and thus began a theatrical career. Returning to America, he won popular favor in a number of rôles, including the leading parts in *Dr. Jekyll and Mr. Hyde*, *Beau Brummell*, *Monsieur Beaucaire*, *Julius Caesar* (in which he acted Brutus), *Peer Gynt* and *The Scarlet Letter*. The latter he adapted himself from Hawthorne's novel.

MANSLAUGHTER, *man slaw'tur*. See MURDER.

MANTELL, ROBERT BRUCE (1854-1928), a noted actor and theatrical manager who rendered valuable service to the American people by bringing before them the art of Shakespeare. Mantell and a gifted company traveled in the United States for several seasons, presenting *Hamlet*, *Othello*, *Julius Caesar*, *Richard III*, *Macbeth* and other great plays, and their performances were at all times dignified and instructive. Mantell was a native of Scotland. After 1885 he was a familiar figure to American theater patrons. He also appeared in moving pictures, principally in plays he made famous on the stage.

MAN'TIS, a genus of insects, remarkable for their grotesque forms. They frequent



PRAYING MANTIS

trees and plants, and the forms and colors of their bodies and wings are so like the leaves and twigs as to be almost indistinguishable. One species, called *praying mantis*, has received its name because it holds its forelegs in the position of the hands of

a person at prayer. In its habits, the mantis is voracious, killing insects and cutting them to pieces. It is a native chiefly of tropical regions, but one species is found in the United States.



MANUAL TRAINING, a department of education that systematically teaches the theory and use of tools, the nature of common materials, and the elementary processes in the more common industrial arts, such as carpentering, wood carving, forging and machine-shop practice. In a broad

sense manual training includes also such branches as cooking and sewing, which are especially suited to girls. The purposes of manual training are (1) to enable the child to enlarge his powers of expression, through the action of the hand, guided and controlled by the action of the mind; (2) to make him acquainted with the nature and use of the most common materials, such as clay, wood, iron and textiles; (3) to lead him to develop a certain degree of skill in the use of tools; (4) to develop his originality, and (5) to connect the work of the schools with the affairs of everyday life.

The weight of the best educational thought upon this subject is that manual training should commence at the beginning of the elementary school work and that it should be continued through the high school period; that the work should not be confined to a single material and the tools necessary in the treatment of that material, but that it should cover a wide range in the use of tools and materials. In the lower grades the construction work in drawing constitutes a natural basis and preparation for the more elaborate work of the sixth, seventh and eighth grades, which includes mechanical drawing, practical exercises in carpentry, and lessons in the use of woodworking tools. The accompanying table gives a suggested course for the three upper grades.

In the high schools there is a continuation of carpenter work, in addition to machine work, forging, etc. In many large cities there are technical high schools with well-equipped workshops and laboratories, where pupils perform the same sort of work that

Suggested Course in Manual Training for Grammar Grades

Grades.	Design.	Mechanical drawing.	Boys.			Design	Girls.	
			Industrial arts.				Household arts.	
			Course A.	Course B.	Course C.		Course A.	Course B.
Sixth.	Largely articles to be made (a progressive course).	Largely working plans of articles to be made (a progressive course).	Carpentry.	Printing.	Bookbinding and printing each one-half year.	Related to household and home planning, furnishing, and decoration.	Sewing.	Sewing, cookery and general home management.
Seventh.	Same, with new principles of design.	do.	Elementary benchwork in wood.	Woodwork (carpentry or benchwork).	Woodwork (carpentry and benchwork each one-half year).	do.	do.	Do.
Eighth.	Same, with new principles of design.	do.	Elementary metal work.	Metal work.	Metal work and electricity each one-half year.	do.	Cookery.	Do.

is done in industrial plants. In some instances employers permit young workers to spend part of the day in such schools, that they may receive technical training in preparation for the trade selected.

History in America. The first manual training school in the United States was opened in Saint Louis in 1880, under the direction of Doctor Calvin M. Woodward, as a department of Washington University. Such excellent results were obtained from this school that other large cities established similar schools, either as independent institutions or as departments in existing high schools.

The introduction of manual training into the elementary schools began in 1882, in the Dwight School of Boston. Progress, however, was slow. Many patrons were opposed to the work, because they believed that the time of a school should be devoted to the study of books; also, because of the extra expense for material and because teachers were not prepared to do the work. At first the work lacked system, and the results were very crude; but with the establishing of the Sloyd School of Boston, a way was prepared for the introduction of this system of construction work into the elementary schools. Wherever Sloyd was introduced and taught by competent teachers, the results were so satisfactory as highly to recommend it.

Modifications of the Sloyd system and other systems have followed; and now manual training constitutes a regular feature of the system of instruction in every large city and in more than three-fourths of the cities of 8,000 inhabitants in the United States, while a large number of cities below 8,000 population have introduced it, either in the elementary schools or in the high school. A movement was begun by the National Education Association for the introduction of manual training and elementary agriculture into the rural schools and the schools of small towns and villages. A committee was appointed to investigate the feasibility of such a movement and to prepare plans for carrying it out, provided the work was found feasible. This committee made a long report and recommended the introduction of these lines of work into all rural high schools and into consolidated common schools in which there were several grades. The committee also recommended the establishment of secondary schools in rural com-

munities, in which instruction in the elements of agriculture, manual training and domestic economy should be made leading features. The committee did not, however, see its way clear to recommend the general introduction of manual training into one-room schools, because of the lack of suitable apparatus, the crowded condition of programs in such schools and the inability of most teachers of rural schools to do the work.

Related Articles. Consult the following titles for additional information:

Domestic Science	Nature Study
Drawing	Sloyd

MANUEL II (1899-1932), the last king of Portugal, overthrown in the revolution in 1910 which made the country a republic. He reigned only two and a half years. During the revolution he escaped to England, where he resided thereafter, and where he married a princess of the House of Hohenzollern. In 1911 and 1912 attempts were made by royalists to establish him again on the throne, but they failed; a like attempt in 1919 was defeated. Manuel was born in Lisbon. His private life was not above criticism, either before or after he ascended the throne in 1908, upon the assassination of his father Carlos I.

MANURES', *manurze'*, substances applied to the soil for the purpose of aiding in the production of crops. Manures are divided into natural manures and artificial manures, or commercial fertilizers. By natural manure is usually meant the excrements of farm animals, also called stable manures; but the term may also include green manures, which are growing crops plowed under for the purpose of adding to the organic matter of the soil. Plants obtain their food from the air and the soil, and the continued growing of crops tends to exhaust the substances in the soil which are the most important elements of plant food. These are nitrogen, potash and phosphoric acid. Manure is used to restore this loss. It does this directly and indirectly; directly, since it contains the substances needed and sets them free by decomposition; indirectly, since the manure by its decomposition causes such chemical changes in the soil as to liberate the plant-food already there, which the plant alone cannot obtain.

Stable manures are injured by exposure to air and rain and should be kept under cover. They are the most effective when rotted, unless the process is carried on in

the open air, when much of the value is lost; therefore, if manure cannot be kept under cover it should be spread upon the land before rotting begins. Manure usually gives the best results when spread evenly over the surface and plowed under or harrowed in. Stable manures are bulky and are at best three-fourths water. A ton of such manure contains less than forty pounds of plant-food; consequently, good fertilizing requires several tons to the acre. See FERTILIZERS; GUANO.

MANUSCRIPTS, literary writings of any kind, whether on paper or any other material, as distinguished from printed matter. Although properly including all writings on hard substances, such as stone or baked clay, the term as generally used means only those writings which are on parchment or on paper. The paper of the ancient manuscript is sometimes Egyptian, prepared from the real papyrus shrub, sometimes cotton or silk paper, which was invented in the East early in the eighth century A. D. and continued in use until after the invention of linen paper. The most common ink is a black, made of lampblack or burned ivory or bone. Red ink of a dazzling beauty is also found in some ancient manuscripts. With this color were written the initial letters, the first lines and the titles, which were thence called *rubrics*. Blue, green and yellow inks were more rarely used. On rare occasions gold and silver were used, though from their cost they were oftenest confined to initial letters.

Illuminated Manuscripts. The art of illuminating manuscripts dates from the remotest antiquity. The Egyptian papyri were ornamented with vignettes or miniatures attached to the chapters, either designed in black outlines or painted in primary colors. It is supposed that the Egyptians used gold and silver for decorating their manuscripts, but no trace of such work has been found. The oldest ornamented Greek and Roman manuscripts that have survived are the Dioscorides of Vienna and the Vergil of the Vatican, both of the fourth century. From the eighth to the eleventh century, initial letters were composed of figures of men, quadrupeds, fishes and birds, while the initials of the twelfth century were made up of masses of conventional foliage, interspersed with the animal figures of the preceding centuries. Continuous borders, with

vignettes and tailpieces, were also prevalent in later times, and some manuscripts are ornamented with very artistic designs. From the sixth century to the sixteenth, the art of illuminating manuscripts was much practiced in Europe, and the ornamentation was often very complex and very brilliant. With the invention of printing the art became practically extinct.

MAN WITHOUT A COUNTRY, THE, a story written by Edward Everett Hale, which, though not narrating an actual occurrence, is so convincing in its realism that it has the effect of real history. It has done much to stimulate patriotism and respect for the flag in young Americans. The story, in brief, is as follows:

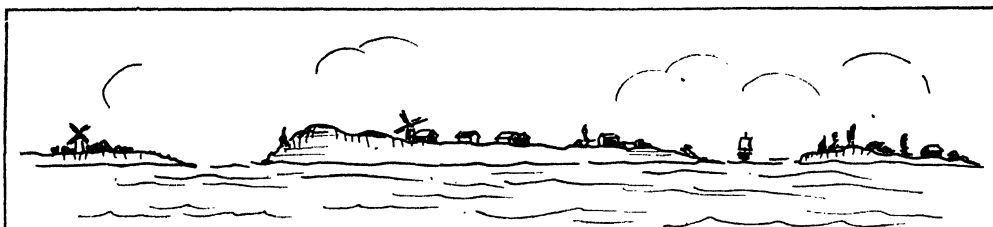
Philip Nolan, a lieutenant of the United States army, was implicated in the Aaron Burr conspiracy. During his trial he was asked if he wished to say anything to show his loyalty to the United States. In a moment of nervous irritation he cried out, "Damn the United States! I wish I may never hear of the United States again!" As a result of this outburst he was sentenced to spend the rest of his life at sea, where he was never permitted to hear the name of his country or any news of it. He lived to be an old man, but not until he was on his death-bed did he learn of the marvelous growth of his country and the great events that had happened during his exile. In a pathetic dying statement he gave utterance to his love for country and flag, and asked that a stone bearing the following inscription be set up:

In Memory of
Philip Nolan,

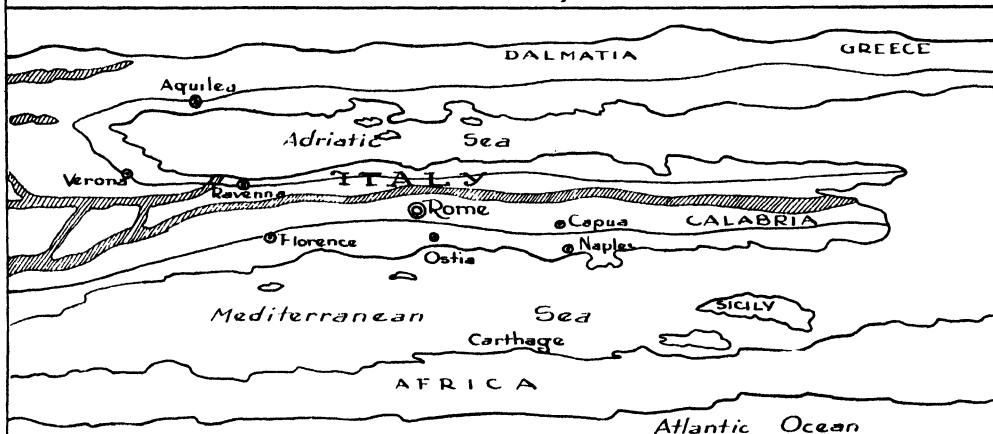
Lieutenant of the Army of the United States. He loved his country as no other man has loved her; but no man deserved less at her hands.

In 1918 this story was effectively presented in moving pictures. It was first published in the *Atlantic Monthly* in 1863.

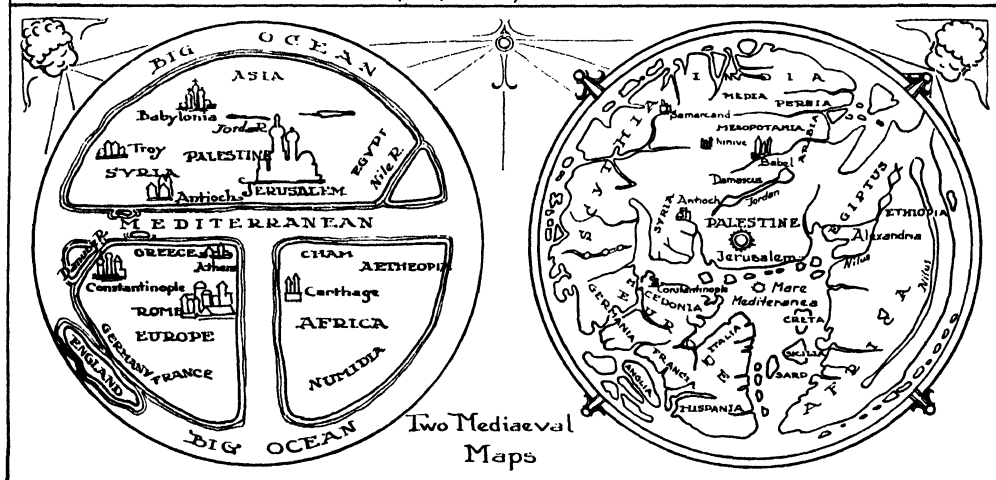
MANX, the name of the native inhabitants of the Isle of Man (see MAN, ISLE OF). They are a branch of the Celtic race, and their language is closely related to Scottish Gaelic and to Irish. Manx is spoken chiefly in the northwestern parishes of the island and along the west coast, and is taught in the parish schools, together with English. Hall Caine, a novelist whose ancestors came from the Isle of Man, has given some inter-



A Picture Map



A Roman Map of Italy and Environs



Two Mediaeval Maps

TYPES OF ANCIENT MAPS

In this encyclopedia will be found other maps of the ancient type. In 1502 Bartholomew Columbus, brother of Christopher, made a map such as shown on page 894. Martin Frobisher's map of the world appears on page 1418. On page 1569 is a map of the world according to Homer. Modern writers use maps to show many things.

esting pictures of Manx life and character in *The Manxman*, *The Christian* and other books.

MANZANILLO, *mahn sa nee'lyo*, CUBA, a seaport on the southern coast of the island, in the province of Oriente. It has a good harbor, and its coastwise traffic is extensive. The region about it is low and unhealthful. Sugar, tobacco and lumber are the chief exports. Population, 1933, 63,211, including suburbs.

MAORIS, *mah'o reez*, the native inhabitants of New Zealand. They belong to the Polynesian branch of the Malay race and are characterized by their stature, which is above the average, and by their excellent physical development. Tattooing is common among them, and they are also noted for their ornamental and decorative art. Formerly they were among the fiercest cannibals of the South Pacific, but after they were conquered by the British they rapidly adapted themselves to the customs of civilization and are now an intelligent and industrious people.

MAP, a drawing, picture or diagram of a portion of the earth's surface or of a part of the heavens, presented in one or more colors. It is always drawn to scale; that is, an inch or fraction of an inch on the drawing represents a stated number of miles, meters or kilometers of surface of the thing pictured. Such a scale is only approximately correct, however, if the parallels are shown at right angles, for such a map does not take into account the curvature of the earth (see *Mercator's Projection*, below).

Kinds of Maps. Besides the familiar political and relief maps there are many kinds, technical in detail, of which the average person seldom hears. Among these are navigators' maps, called charts, maps of the ocean bed, and the like.

A Political Map. A map showing the divisions of a country into states or provinces, or one showing counties comprised within a state, together with the locations of cities and towns, railroad routes and electric lines is called a political map, because it represents political, or man-made, divisions.

A Relief Map. If a map gives no consideration to political boundaries, to cities or to other conditions set up by man, but pictures physical aspects, such as mountains, valleys, rivers, plains, plateaus, etc., showing graphically proportionate elevations, it is known as a relief map.

A Historical Map. Some maps are intended to picture political changes in a series of historical events, in regular sequence; these are known as historical maps. An example is a series of diagrams showing the development of the forty-eight states of the American Union from a fringe of thirteen colonies along the Atlantic seaboard, or a series showing the growth of France.

Mercator's Projection. Gerard Mercator (1512-1594) was a Flemish geographer who first made maps with all parallels of latitude and longitude at right angles. This style was known as *Mercator's projection*. Such a map does not show serious distortion when representing small areas near the equator, but in maps of large areas far from the equator a lack of proportion is inevitable.

[The publishers have presented in these volumes several hundred maps, to amplify and clarify the text—colored, where needed to mark political boundaries; physical, to indicate surface conditions, and scores of illuminating drawings.]

MAPLE, a family of trees peculiar to the northern and temperate parts of the globe. About 100 species are known, distributed through Europe, North America and different parts of Asia. The maples are characterized by their opposite branches, palm-shaped leaves, with from three to seven lobes, by their full, symmetrical tops, when growing in the open country, by their gray bark and by their hard, fine-grained wood, which is white, or in the older trees, slightly rose-tinted. The *sugar*, or *rock*, maple is the most important species; this yields maple sugar, an important product of Vermont, New York and other states, and some parts of Canada. Its leaf is the emblem of Canada. The knotted parts of the sugar-maple furnish the pretty *bird's eye* and *curled maple* of cabinet-makers (see below).

Some other American species are the *white maple*; the *red*, or *swamp maple*; the *striped maple*, or *moosewood*; the *mountain maple*, the *vine maple* and the *large-leaved maple*. Two species are common in Great Britain, the *great maple*, often miscalled sycamore, and the *common maple*. The wood of the former is valuable for various purposes, as for carving, turnery, musical instruments and wooden dishes. Another well-known species is the *Norway maple*, often planted in Great Britain as an ornamental tree.

Bird's-eye Maple, a peculiar formation of sugar maple caused by a defect in the growth of the wood. The defect is the result of injury to the bark. A piece of bird's eye maple shows a number of small, round spots not unlike bird's eyes, and when polished it is very attractive. Curled maple, another variation from the ordinary wood, has wavy ripples instead of a straight grain. Both forms are used in making high-grade furniture.

MARABOU STORK. See STORK.

MARACAIBO, *mah rah ki'bo*, a seaport of Venezuela, on the west shore of the strait which unites the lake and gulf of the same name. It is important, for it is the only port of entry for Western Venezuela and Eastern Colombia. There is a good trade in coffee, cacao, timber, hides and medicinal plants. The climate, though hot, is healthful. Population, last census, 74,767.

MARACAIBO, LAKE, a lake of Venezuela, eighty miles wide in its greatest extent, connected with the Gulf of Venezuela by a channel nine miles wide. The lake is 500 feet deep in places, but it cannot be entered by large vessels on account of a bar at its entrance.

MARAJÓ, *mah ra zho'* or **JOANNES**, a large island of Brazil, at the mouth of the Amazon, between the estuaries of the Amazon and Para rivers, belonging to the province of Para. Its length is about 180 miles, its width, 150 miles, but the population is scanty and consists largely in transient dwellers, who come to the island to hunt or to gather rubber. During the rainy season it is mostly a vast marsh. (See illustration, in article AMAZON.)

MARAT, *ma rah'*, **JEAN PAUL** (1744-1793), one of the most famous leaders of the French Revolution, whose career was ended by the act of a courageous young woman. On the outbreak of the Revolution Marat became the editor of the *L'Ami du Peuple*, or *Journal de la République Française*. This was the organ of the radicals and it soon became the oracle of the mob. It early advocated the most extreme measures, and the tone became more furious as Marat was inflamed by the prosecutions of the authorities. In 1792 he took his seat at the Commune and played a leading part in the assassinations of September, 1792. He was a member of the Committee of Public Safety and of the Convention and as president of the Jacobin club,

he signed an address instigating the people to an insurrection and to the massacre of all traitors. For this Marat was delivered over to the revolutionary tribunal, which acquitted him; and the people received him in triumph and covered him with wreaths. He was assassinated shortly after by Charlotte Corday (see FRENCH REVOLUTION; CORDAY D'ARMONT).

MAR'ATHON, a village of ancient Greece, in Attica, about twenty miles northeast of Athens. It was situated on a plain which extends for about six miles along the seashore. On this plain Miltiades, the Athenian general, defeated Darius with his Persian forces in 490 B. C. The battle has been called one of the "fifteen decisive battles of the world" (see FIFTEEN DECISIVE BATTLES).

Marathon Race. After the battle was won Miltiades selected a swift runner named Pheidippides, bidding him bear the joyful news to the people at Athens. The runner obeyed, reaching the city in exhaustion, and as soon as he had told the news, dropped dead. In commemoration of this event the long foot race in the Olympian games was called the Marathon Race. See OLYMPIAN GAMES.

MAR'BLE, the most beautiful and the most expensive stone for building purposes and the one invariably used for fine sculptures, is limestone which has undergone purification and crystallization by the intense internal heat of the earth. It is harder and more finely grained than limestone, and will receive a high polish. The crystals are infinitely small, but they may be seen through a magnifying glass.

Pure marble is perfectly white, but there are many varieties and colors, owing to the different impurities in the rock. This, however, is an advantage, since the different varieties are suited to many different purposes. Some varieties are also harder and stronger than others, and some will withstand the water better than others. All these varieties are grouped under five classes: (1) pure or single-colored marbles; (2) variegated; (3) brecciated, that is, made of other rocks cemented by limestone; (4) fossiliferous, made wholly or in part of fossils; (5) statuary, which is perfectly white.

Where Found. Marble is found in a number of localities, but the quarries most widely known are those in Italy, on some islands of the Mediterranean Sea and in the United States. Of the foreign quarries those at

Carrara, Italy, yielding the celebrated Carrara Marble, are at present the most widely known. The Carrara quarries are still productive, after having been worked for about two thousand years. In the United States the most extensive quarries are found in Rutland County, in the southwestern part of Vermont. Other important quarries occur in Georgia, Massachusetts, Maryland, Tennessee, Missouri; some are in Alaska. There are also quarries of considerable value in California, Colorado and Arizona.

In the American quarries and marble works most of the work is done by machinery, and there is very little waste, but in the foreign countries the old methods of blasting the rock and cutting by hand are still in vogue. This involves much waste and requires a long time for cutting the stone from its bed. Marble is extensively used for headstones, monuments and for finishing the interiors of buildings. It is very durable when shielded from the weather.

Related Articles. Consult the following titles for additional information:

Building Stone	Fossil
Carrara Marble	Sculpture

MARBLES, like tops and balls, are playthings that never lose their popularity. The variety of games played with marbles is almost endless, and every locality has its own favorite games. The snow is no sooner off the ground in towns and villages than every boy brings out his marbles and plays vigorously with them for a few weeks, when they disappear suddenly and completely for another year, usually giving way to more exciting sports.

Coburg, in Saxony, where hard limestone is found, is a center of manufacture for common marbles. This stone is broken into small cubes, and several hundred of these cubes are placed in grooves cut around a stationary millstone. Revolving on this millstone is a block of oak, which smooths the cubes into rough spheres while water runs over them. Later the marbles are polished in revolving barrels, lined with stone. Three mills, it is said, will manufacture 60,000 marbles in a week. Agate marbles are made at Oberstein by pressing the hot glass into metal molds. The bull's-eye and striped marbles are molded in clay, then baked, painted and glazed. Natural onyx marbles are manufactured on a large scale in Akron, Ohio.

MARCH, in the modern calendar the third month of the year, named in honor of Mars,

the Roman god of war. In the old Roman calendar March was the first month, and in England, until 1752, New Year's Day was the twenty-fifth of March. Now, as in ancient times, March has thirty-one days. The first day of spring comes technically on the twenty-first of this month, and it is the month that brings back the robin to northern climes. It very often happens, however, that severe cold and deep snows continue to the end of the month, and it has the reputation of being windy and blustering. As early spring is a most uncertain season, mild, balmy days and blizzards are likely to occur in close proximity in this month. March 4 was formerly the inauguration day of the President of the United States; in 1933, by Constitutional amendment (the twenty-first) the date of inauguration was changed to January 20, his four-year term of office beginning then.

The special flower of March is the violet, and its gem is the bloodstone, or heliotrope.

Anniversaries for Celebration. The following birthdays of notable people fall in March:

William Dean Howells, March 1, 1837.
 Augustus Saint Gaudens, March 1, 1848.
 Pope Leo XIII, March 2, 1810.
 Alexander Graham Bell, March 3, 1847.
 James Lane Allen, March 3, 1848.
 Elizabeth Barrett Browning, March 5, 1806.
 Michelangelo, March 6, 1475.
 Philip H. Sheridan, March 6, 1831.
 Luther Burbank, March 7, 1849.
 Americus Vesputius, March 9, 1451.
 Dudley Buck, March 10, 1839.
 William Lyon Mackenzie, March 12, 1795.
 Andrew Jackson, March 15, 1767.
 James Madison, March 16, 1751.
 John C. Calhoun, March 18, 1782.
 Grover Cleveland, March 18, 1837.
 David Livingstone, March 19, 1813.
 William Jennings Bryan, March 19, 1860.
 Charles W. Elliot, March 20, 1834.
 Johann S. Bach, March 21, 1665.
 Rosa Bonheur, March 22, 1822.
 Raphael, March 28, 1483.
 John Tyler, March 29, 1790.
 John Fiske, March 30, 1842.
 Franz Joseph Haydn, March 31, 1732.

The following important events occurred in March:

Ratification of Jay Treaty, March 1, 1796.
 Nebraska admitted to the Union, March 1, 1867.
 Passage of Missouri Compromise, March 2, 1820.
 Florida became a state, March 3, 1845.
 William Penn given grant of Pennsylvania, March 4, 1681.
 Vermont became a state, March 4, 1791.
 Massacre at the Alamo, March 6, 1836.

Founding of Providence, R. I., March 7, 1638.
 Amundsen's announcement of his discovery of the South Pole, March 7, 1912.
 Battle between the Monitor and the Merrimac, March 9, 1862.
 Grant appointed commander in chief, March 12, 1864.
 Whitney's cotton gin patented, March 14, 1794.
 Maine became a state, March 15, 1820.
 Nicholas II of Russia abdicated, March 15, 1917.
 Founding of West Point Military Academy, March 16, 1802.
 Death of Robert F. Scott and his party on their return from the South Pole, March 21, 1912.
 Patrick Henry's "Liberty or Death" oration delivered, March 23, 1775.
 Abolition of slave trade in British dominions, March 25, 1807.
 British North America Act passed by Parliament, March 29, 1867.
 Marshal Foch became supreme head of the allied forces, March 29, 1918.
 First meeting of Congress under new Constitution, March 30, 1789.

MARCONI, GUGLIELMO (1874-1937), a celebrated Italian electrician, to whom is due chief credit for the invention of wireless telegraphy. He was born near Bologna, Italy, and educated at the University of Bologna. Marconi showed remarkable aptitude for electrical science at an early age. Especially was he interested in perfecting apparatus that would permit sound signals to be transmitted through the air by means of electromagnetic waves, without the agency of wires, as in ordinary telegraphy. His early efforts were successful, but he received so little encouragement from the Italian government that he went to England in 1896, and carried on his experiments there, setting up his first wireless telegraph station near Cornwall. Marconi was a pioneer in the field of radio. He demonstrated the success of his invention by sending signals across the Atlantic for the first time in 1901. In 1904 the Marconi Company installed a daily news service by wireless telegraphy on the trans-Atlantic liners, and three years later established a public wireless service between England and North America. The Marconi system is now in general use throughout the world. Marconi has continued his experiments and has perfected a wireless telephone. His inventions and discoveries won for him the Nobel prize in physics for 1909. In 1915 he took charge of the wireless telegraph service of the Italian government. In 1929 he was created a marquis.

MARCO POLO. See POLO, MARCO.

MARCUS AURELIUS. See AURELIUS, MARCUS.

MARCY, *mahr'sy*, WILLIAM LEARNED (1786-1857), an American statesman, was born at Southbridge, Mass. He began the practice of law at Troy, N. Y., but enlisted in the War of 1812, becoming captain in the army but retiring from the service before the close of the war. In 1831 he was chosen United States Senator, and in the following year he became governor, which office he held for three terms. During his brief service in the Senate, he was a staunch follower of Andrew Jackson, and was the first to declare the propriety of the rule that "to the victors belong the spoils of the vanquished." He became Secretary of War in 1845 and under Pierce was Secretary of State.

MARDI GRAS, *mahr'de grah'*, or SHROVE TUESDAY, in Catholic countries of Europe a celebration on the last day of revelry before the advent of Lent. The term is from the French, and means *fat Tuesday*, referring to the old French custom of parading a fat ox through the streets during the festivities. The day following is Ash Wednesday.

Only in New Orleans in the United States is the celebration of Mardi Gras famous, although a few other cities celebrate the day. The first New Orleans Mardi Gras day was in 1857, and not a year was thereafter missed until 1917. No celebration was held that year, nor in the two succeeding years because of the World War. In New Orleans on the occasion of the Mardi Gras at the height of the celebration there is a parade in which are seen gorgeous floats and thousands of people in costumes of every conceivable design. The streets are decorated with banners and streamers, and especial illumination is provided. The event attracts thousands of visitors from great distances. See SHROVE TUESDAY; ASH WEDNESDAY.

MARE ISLAND, an island in San Pablo Bay, near San Francisco, of importance because it is the site of the chief United States naval station on the Pacific. It has a large navy yard, an arsenal, a dry dock, an observatory and a large plant for building war vessels.

MAREN'GO, BATTLE OF, a famous battle fought near Alessandria, Italy, June 14, 1800, between the French, under Napoleon, and the Austrians under General Melas. The Austrians were completely defeated and were

obliged to surrender Genoa, Piedmont and Milan. Napoleon's supremacy was firmly established by this victory.

MARIA CHRISTINA, *ma ré'a kris té'nah* (1806-1878), a queen of Spain, daughter of Francis I of the Two Sicilies. She was the fourth wife of Ferdinand VII of Spain and bore to him in 1830 a daughter, Isabella, who, in virtue of a proclamation issued before her birth, became heir to the kingdom. Isabella was destined to be the grandmother of Alfonso XIII, later the king of Spain. When Ferdinand died, Maria Christina was made her guardian, but when civil war broke out on account of the pretensions of Ferdinand's brother, Don Carlos, to the throne, Maria Christina took little interest in the affair. Her entire attention seemed to center in one of her royal bodyguard, whom in 1833 she married. She became exceedingly unpopular, and in 1840 she was obliged to escape to France. In 1843 she returned to Spain, but eleven years later she was driven from the country. In 1864 she again returned, but was again driven into exile.

MARIA LOUISA, *loo ee'zah*, (1791-1847), second wife of Napoleon I, daughter of Francis II of Austria. Her marriage with Napoleon took place in 1810, after the divorce of Josephine, and in 1811 she bore him a son, who was later named king of Rome. After his overthrow, she received in 1816 the duchies of Parma, Piacenza and Guastalla, which she governed till her death.

MARIANA ISLANDS. See LADRONE ISLANDS.

MARIA THERESA, *te ré'sah*, (1717-1780), a queen of Hungary and Bohemia, archduchess of Austria and wife of the Emperor Francis I. On the death of her father, Charles VI, in 1740, she ascended the throne of Hungary, Bohemia and Austria, and a little later she declared her husband joint ruler. Her accession was in accordance with the Pragmatic Sanction, to which her father had secured the consent of the powers of Europe, but her claims were at once contested. Frederick the Great made himself master of Silesia; Spain and Naples gained possession of the Austrian territory in Italy, and the French, Bavarians and Saxons marched into Bohemia, carrying all before them. Charles Albert was proclaimed archduke of Austria and shortly after emperor of Germany; the young queen fled to Pressburg, where she convoked the diet and threw

herself upon the sympathy of her Hungarian subjects. The French and Bavarians were speedily driven from her hereditary states; Prussia made a secret peace with the queen, who unwillingly abandoned Silesia to Frederick, and by the treaty of Aix-la-Chapelle (1748) her husband was declared emperor.

During the time of peace which followed, Maria Theresa, with the aid of her husband and her minister Kaunitz, made great financial reforms; agriculture, manufactures and commerce flourished, the national revenue greatly increased and the burdens were diminished. The Seven Years' War again reduced Austria to a state of great exhaustion, but on its conclusion the empress renewed her efforts to promote the prosperity of her dominions. Her son Joseph was elected king of the Romans in 1764, and on the death of her husband, in 1765, she associated the young prince with herself in the government. In 1772 she joined in the dismemberment of Poland, obtaining Galicia for Austria, and in 1777 she acquired Bukowina from Turkey. Of her sixteen children ten survived her, one of whom was the unfortunate Marie Antoinette.

Related Articles. Consult the following titles for additional information:

Aix-la-Chapelle,
Treaties of
Charles VI

Pragmatic Sanction
Seven Years' War
Succession Wars

MARIE ANTOINETTE, *ma ree' ahN twan net'*, (1755-1793), a beautiful queen who was one of the most unfortunate of the victims of the French Revolution. She was the youngest daughter of the Emperor Francis I and Maria Theresa of Austria, and was married at the age of fifteen to the Dauphin, afterward Louis XVI. Her manners were ill-suited to the French court, and she made many enemies by her contempt for its ceremonies. The freedom of her manners was frequently the occasion of scandal, for her youthful spirits and her impatience with court etiquette led her into indiscretions.

Without doubt, she had great influence over the king, and she constantly opposed all measures of reform. The enthusiastic recep-



MARIE
ANTOINETTE

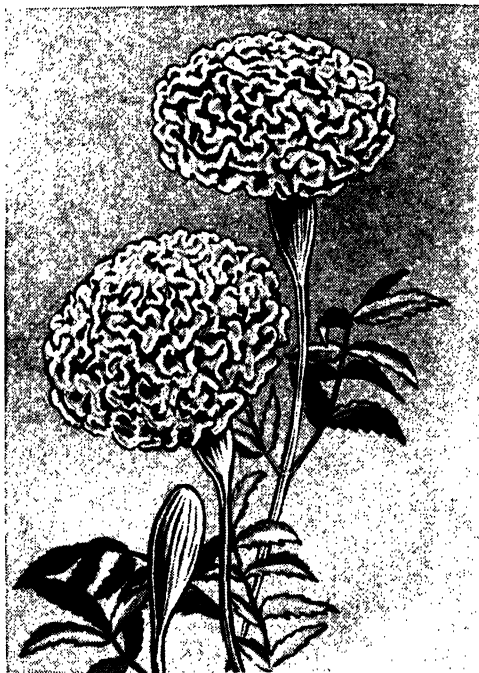
tion given her at the guard's ball at Versailles on October 1, 1789, raised the general indignation to the highest pitch, and was followed in a few days by the insurrection of women and the attack on Versailles. When the royal family were practically prisoners in the Tuileries it was she who advised their flight, in June, 1791, an episode which ended in their capture and return.

On August 10, 1792, she heard her husband's deposition pronounced by the Legislative Assembly and accompanied him to the prison in the Temple, where she displayed the magnanimity of a heroine and the patient endurance of a martyr. In January, 1793, she parted from her husband, who had been condemned by the Convention; in August she was removed to the Conciergerie, and in October she was charged before the revolutionary tribunal with having dissipated the finances, exhausted the treasury, corresponded with the foreign enemies of France and favored the domestic foes of the country. She defended herself with firmness, decision and indignation; and she heard the sentence of death pronounced with perfect calmness—a calmness which did not forsake her when the sentence was carried out the following morning. There has been endless controversy as to the character of Marie Antoinette, and it seems certain that the bitter statements of her detractors are no more to be received absolutely than are the eulogies of those who regard her as a martyr and saint.

MARIETTA, OHIO, the county seat of Washington County, 125 miles southeast of Columbus, on the Ohio River, at the mouth of the Muskingum, and on the Baltimore & Ohio and the Pennsylvania railroads. The city also has an airport and interurban service. It is the oldest settlement in Ohio, founded by a colony from New England under the Ohio Company in 1788. In the same year the government of the Northwest Territory was formally organized here. The city is the seat of Marietta College; there are two hospitals, a Carnegie Library and, also, the oldest church and the oldest building in the Northwest Territory. Petroleum, coal and iron are found in the vicinity, and there is a large river trade. The manufactures include flour, oil machinery, paints, lumber products, furniture, grindstones, cement blocks, gas engines, glass and other articles. Twelve miles below the city is Blennerhassett Island, the scene of incidents connected with the con-

spiracy of Aaron Burr (see BURR, AARON). The city is governed on the mayor-council plan. Population in 1920, 15,140; in 1930 it was 14,285, a decrease of 6 per cent.

MARIGOLD, a name of several plants belonging to the composite family. The common marigold is a native of France and of the more southern parts of Europe. It is



MARIGOLDS

an annual, from one to two feet high, bearing large, deep yellow flowers. It is as prolific as any weed and was formerly used in cookery and as a medicine. The so-called African marigold and French marigold, common in flower borders, are both Mexican species and have brilliant flowers.

The name *marigold* is applied wrongfully to several plants. The English marigold is really a chrysanthemum, and the American marsh marigold belongs to the buttercup family.

MARINE CORPS, a body comprising the enlisted fighting men of a navy, particularly of the United States navy. Originally they were not regarded either as sailors or soldiers, and their status was in question, but within a score of years a romance has enveloped them as real "soldiers of the sea." They are as truly soldiers as any body of infantrymen.

The marines on a war vessel man the guns and the fighting positions, but not all their work is on shipboard. Indeed, their duties are more often ashore. It is said that the marines are "the first to fight," and this is true. In any remote United States possession if trouble breaks out a United States war vessel sends marines ashore to restore order. They are in the midst of events long before soldiers arrive, if, perchance, the latter are needed at all. They garrison outlying posts and serve there as naval police. This is true not only in far-away places under the American flag, but in other lands, as well. Frequently insurrections in Central American states become serious, and the authorities call for the help of American war vessels. Marines are landed, and they remain as long as they are needed. In other countries, if American interests are jeopardized or American lives are in danger, marines may be sent to protect their countrymen.

In the World War the American marines won glory which will live in history. Eight thousand of them faced the famous Prussian Guards in 1918 in Belleau Wood, in Northeastern France. They defeated the finest troops of Germany, but paid a price of 6,000 killed or wounded. Grateful France the next day renamed the spot the "Wood of the American Marines."

Candidates for admission to the marine corps must be between the ages of eighteen and thirty-five. In peace times, at least, the position of a marine may be considered enviable. He is well cared for and well clothed; he has advantages of education on shipboard, and is quite likely during his period of service to see a great deal of the world. He receives from \$30 per month upward (with no expenses), and additional pay for certain specified services. The Marines number 1,015 officers and 16,097 privates. Through examination a private may reach officers' rank.

MARINETTE', WIS., the county seat of Marinette County, on Green Bay, at the mouth of the Menominee River, opposite Menominee, Mich., fifty miles north of the city of Green Bay, on the Wisconsin & Michigan, the Chicago, Milwaukee, Saint Paul & Pacific and the Chicago & North Western railroads. The city has a fine harbor and a large lake trade, especially in lumber. The fishing industry is important. It contains large box factories, and manufactories of

paper and wood products, a piano factory, knitting mills, and has machine shops and foundries. There is a county agricultural school and a county normal school. There are two city parks and a library. Marinette was settled in 1857, and was incorporated in 1887. Population, 1930, 13,734.

MARION, FRANCIS (1732-1795), an American Revolutionary commander, whom a British officer called the "old swamp fox." He entered the service as a captain, but was rapidly promoted until he became brigadier-general. In 1775 he served in a regiment organized by Colonel William Moultrie in his native state of South Carolina, and he accompanied Moultrie on his occupation of Fort Sullivan. Later he commanded Fort Moultrie, took part in the attack on Savannah and then retired to South Carolina. With a cavalry force which he himself had organized in South Carolina, he kept up a guerrilla warfare on the British, and in August, 1780, he won a brilliant victory at Nelson's Ferry. At the Battle of Eutaw Springs he distinguished himself by his daring. After the close of the war he was for some time a member of the South Carolina senate.

MARION, IND., the county seat of Grant County, sixty-five miles northeast of Indianapolis, on the Mississinewa River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Nickel Plate, the Pennsylvania, and the Chesapeake & Ohio railroads. There are also electric lines to Indianapolis and other cities. A national soldiers' home is three miles to the south, and the city contains a Carnegie Library, a fine courthouse and a normal school. The principal industrial establishments include wire, fiber, and paper factories and iron and glass companies, foundries and brickyards. The city has a Federal building, a Masonic Temple, eight parks, and an airport. Population, 1920, 23,747; in 1930, 24,496, a gain of 3 per cent.

MARION, OHIO, the county seat of Marion County, forty-five miles north of Columbus, on the Big Four, the Chesapeake & Ohio, the Erie, the Pennsylvania and the Hocking Valley railroads. The city is in a farming region, has lime kilns and quarries and contains manufactories of steam shovels, engines, threshers, carriages, foundry products, agricultural implements, silks and other articles. It has a Carnegie Library, Sawyer Sanitarium, a Y. M. C. A. and a Federal building. There are three parks and three hospitals. There is

an airport. The place was settled in 1815, and was chartered as a city in 1890. Population, 1920, 27,891; in 1930, 31,084. The city was the home of President Harding.

MARIUS, CAIUS (about 156-86 B. C.), a famous Roman general, born of obscure parents. He served with distinction at Numantia in 134 B. C., under Scipio Africanus, was tribune of the people in 119 and acquired much popularity by his opposition to the nobles. In 109 he accompanied the Consul Q. Caecilius Metellus, as his lieutenant, to the Jugurthine War, and later he himself was placed in command of the war, which he brought to a successful conclusion. He had been elected consul in 107, and his successes against the barbarians who threatened Rome made him so popular that he was six times reelected to that office. On the outbreak of the war against Mithridates, Marius, who had long been jealous of Sulla, endeavored to deprive him of his command, and in the struggle which followed the former was compelled to flee from Italy. After hairbreadth escapes he landed in Africa and remained there until recalled by Cinna, who had headed a successful movement in his favor. In company with Cinna he marched against Rome, which was obliged to yield, and later Cinna declared himself and Marius consuls, but the latter died seventeen days later.

Related Articles. Consult the following titles for additional information:

Cinna, Lucius C.	Mithridates
Jugurtha	Sulla, Lucius C.

MARJORAM, a shrub which grows in limy soils of Great Britain, now naturalized in parts of the United States and Canada. The leaves are small and pointed; the flowers are reddish and grow in clustered spikes. Sweet marjoram is a biennial, cultivated in gardens. As soon as it blossoms it is cut and dried and is employed as a seasoning.

MARK, a term originally used in Europe, especially Germany and Spain, to designate eight ounces of silver or gold. It is now used commonly as a money of account and after 1873 was the official monetary unit of the German empire. It weighs .3982 grams, $\frac{1}{100}$ pure gold, and it is worth 24.8 cents in United States money. With German reverses in the World War, and subsequent demoralization of trade and commerce, the mark became practically worthless in exchange value. With the return of peace and stabilization of the monetary system, the mark was restored

to its former value, from which there is little fluctuation.

MARK, SAINT, the Evangelist, according to the old ecclesiastical writers, the person known in the *Acts of the Apostles* as "John, whose surname was Mark" *Acts XII*, 12, 25). He was for many years the companion of Paul and Peter on their journeys. His mother, Mary, was generally in the train of Jesus, and Mark was himself present at a part of the events which he relates in his Gospel. Some of his information he received from eye-witnesses. He was the cousin of Barnabas (*Col. IV*, 10), and he accompanied Paul and Barnabas to Antioch, Cyprus and Perga in Pamphylia. He returned to Jerusalem, whence he afterward went to Cyprus, and thence to Rome. He was the cause of the memorable "sharp contention" between Paul and Barnabas.

MARK ANTONY. See ANTONY, MARK.

MARK'HAM, EDWIN (1852-), an American poet and educator, born in Oregon City, Ore. He spent his boyhood on a cattle ranch in California, in 1871 entered the San José state normal, and later was graduated from the Christian College, Santa Rosa. He became a prominent California educator and rendered valuable service as head master of the Tompkins Observation School at Oakland. From an early age he contributed poems to magazines, but came into prominence at the publication of *The Man with the Hoe* in 1899. Later productions were *Lincoln, and Other Poems*; *The Poetry of Jesus*; *The Shoes of Happiness, and Other Poems*, and *The Hoe-Man in the Making*.

MARK TWAIN. See CLEMENS, SAMUEL LANGHORNE.

MARL, an earthy substance used as a fertilizer, composed of carbonate of lime and clay in various proportions. In some marls the proportion of clay is comparatively small, while in others it abounds and furnishes the chief qualities. The fertility of any soil depends, in a great degree on the suitable proportion of the earths which it contains; and whether a lime or a clay marl will be more suitable to a given soil may be determined with much probability by its tenacity or looseness, moisture or dryness. The quicker action and greater efficiency of slaked lime have in many districts led to its substitution for marl. See FERTILIZERS; SOIL.

MARLBOROUGH, JOHN CHURCHILL, First Duke of (1650-1722), an English gen-

eral, celebrated for his victories in the War of the Spanish Succession. He strengthened his influence at court by his marriage with Sarah Jennings, an attendant upon the princess, afterward Queen Anne. When William III came to the throne of England, Churchill went over to his side, and when the War of the Spanish Succession broke out, Churchill was made by William commander in chief of the English forces in Holland. Anne came to the throne in 1702, and influenced by Mrs. Churchill, gave the general full authority.

In the campaign of 1702 he drove the French out of Spanish Guelders and took Liège and other towns, for which he was created Duke of Marlborough. In 1704 he stormed the French and Bavarian lines at Donauwörth, and in the same year, in conjunction with Prince Eugene, he gained the victory of Blenheim over the French and Bavarians. The years that followed were marked by the brilliant victories at Ramillies, Oudenarde and Malplaquet. On Marlborough's return to England he found that his wife had quarreled with the queen, but subsequently George I reinstated him in the supreme military command. Throughout the rest of his life, however, he lived in retirement. See SUCCESSION WARS.

MARLOWE, *mahr'lo*, CHRISTOPHER (1564-1593), a poet and dramatist of the Elizabethan period, whose great contribution to English literature is that his work was an inspiration to many great poets who followed him. Marlowe's poetic drama *Tamburlaine the Great* was the first English work composed in blank verse, and its metrical form inspired the stately rhythms of Milton. As a tragic dramatist, Marlowe was the literary predecessor of Shakespeare. He was born in Cambridge and was graduated at the university of that name. His literary career ended when he was only twenty-nine. While dining with friends, he was killed in a trivial quarrel. Besides the work mentioned, Marlowe wrote the plays *Edward II*, *Doctor Faustus* and *The Jew of Malta*; and the poem *Hero and Leander*.

MARLOWE, JULIA (1870-), an American actress, one of the foremost Shakespearean artists of her time. She was born in Cumberlandshire, England, but when she was five years of age her parents removed to the United States, where she afterward resided. She was educated in the public schools and began her career on the stage in her twelfth

year, when she joined a juvenile opera company and took part in *Pinafore*, *The Chimes of Normandy* and other light operas. SARAH FRANCES FROST is her real name, but she was known as FRANCES BROUGH during her connection with the juvenile company, "Julia Marlowe" being assumed in later years.

After playing small parts in classic dramas, Miss Marlowe retired from the stage for a period of study, and on reëntering theatrical life made her début as Parthenia in *Ingomar*. After 1888 she starred in Shakespearean and other rôles and was most successful as Viola in *Twelfth Night*, Rosalind in *As You Like it* and Juliet in *Romeo and Juliet*. She married Mr. Robert Taber, for several seasons the leading man in her company, but she was divorced a short time later. In 1911 she was married to E. H. Sothorn, with whom she has played in various Shakespearean dramas. Miss Marlowe retired to private life in 1916, but resumed acting with her husband in 1919.

MARMORA, *mahr'mora*, or **MARMARA**, SEA OF (ancient Propontis), an inland sea, lying between European and Asiatic Turkey, communicating with the Mediterranean by the Dardanelles and with the Black Sea by the Bosphorus. Its greatest length is about 160 miles, its greatest breadth, about fifty miles. It contains several islands, of which the largest is Marmora, famous for its quarries of marble and alabaster. At its north-eastern extremity is the city of Constantinople (which see).

MARMOSET, *mahr'mozet*, the smallest species of the monkey tribe, differing from other monkeys principally in having thick, woolly fur. They are agile in their movements, resemble squirrels in general appearance, feed upon fruit and insects and occasionally upon the smaller birds and their eggs. One species, known as the *silky marmoset*, has a long, silky mane on the head and neck. They are among the most intelligent of the entire monkey family. See MONKEY.

MARMOT, a small gnawing animal, classed with the squirrels. It lives in North America, Europe and Northern Asia. Marmots have thick bodies, short tails and short legs. They live in large communities in long burrows, and during the winter lie in deep sleep. The prairie dog, or prairie marmot, is the most familiar American species. Another species found in America is the wood-

chunk of the middle states. See PRAIRIE DOG; WOODCHUCK.



MARMOT

MARNE RIVER, since 1914 the most notable river in France, better known than even the Seine, into which it flows, four miles from Paris. It was at the Marne that the German armies were stopped in 1914, at the beginning of the World War, after they had declared their intention to enter Paris before the end of September. A series of intensely critical battles, fought between September 6 and September 12, were given the collective name, "the Battle of the Marne." In 1918 this engagement was renamed the "first Battle of the Marne," for the titanic struggle which was the turning point of the war was fought on practically the same field. This time, too, the defending allied troops were fighting to keep the enemy, mad with victory, out of France's beautiful capital. At Chateau Thierry, on the north bank of the river, the Germans were so badly worsted that the retreat then begun is declared by historians to have marked the turning point in the war. In this battle American troops showed their valor. See WORLD WAR, for details.

The Marne is 325 miles long and is navigable for 226 miles, to Saint-Dizier. In many places the current is swift and furnishes water power. Connected with it is a system of canals which reaches 195 miles, to Strassburg, in Alsace-Lorraine.

MARQUE, mahrk, AND REPRI'SAL, LETTERS OF, a license or commission granted by the supreme power of one state to the citizens of this state to make reprisals at sea on the subjects of another nation, under pretense of indemnification for injuries received; that is, it is a license to engage in privateering. Letters of marque were abolished among European nations by the Treaty of Paris of 1856. The United States was invited to accede to this agreement, but declined, because the treaty did not forbid the capture of unoffending neutral ships by a belligerent.

MARQUESAS, mahr ka'sas, ISLANDS, a group of volcanic islands in the Pacific Ocean, about 8° 11' south latitude and 140° west longitude. There are thirteen islands and islets, and their joint area is about 480 square miles. The principal products are yams, breadfruit and cocoanuts. These islands were discovered in 1595, rediscovered in 1813 and named Washington Islands, for it is a matter of history that they once belonged to the United States, having been so proclaimed by Commodore Porter, who visited them. The American government, however, never claimed jurisdiction, and they became French territory in 1842. The population is about 2,300.

MARQUETTE, mahr ket' JACQUES (1637-1675), a French Jesuit missionary and explorer in America. He came to Canada in 1666, founded the mission of Sault Sainte Marie in 1668, and in 1673 accompanied Joliet upon his exploration of the Mississippi. In the following year, Marquette founded a mission among the Illinois Indians, but contracted fever and died before reaching Upper Michigan. His pure character and lofty aims gave him a powerful influence among the Indians with whom he labored. Wisconsin has placed his statue in the rotunda of the Capitol at Washington.

MARQUETTE, mahr ket', MICH., the county seat of Marquette County, on Marquette Bay, Lake Superior, and on the Duluth, South Shore & Atlantic and the Lake Superior & Ishpeming railroads; there is adequate motorbus service. The city is one of the principal shipping points of ore from the Lake Superior region. It has iron works, foundries, machine shops, sash and blind factories, flour and lumber mills, chemical works and shops of two railroads. The Northern State Teachers College is located here, and the city has a Federal building, a courthouse, an opera house, the Peter White Public Library, Episcopal and Roman and French Catholic cathedrals and the Upper Peninsula state prison and house of correction. The place was settled in 1845, and chartered as a city in 1869. The commission form of government was adopted in 1914. Population, 1930, 14,789.

MARQUIS, mahr'kwis, a title of nobility in Great Britain, ranking next below that of duke and above that of earl and baron. The wife of a marquis is a marquise, or marchioness. See NOBILITY.

MARRIAGE, *mar'ij*, an assumed relationship between a man and a woman, by which they are united supposedly for life, and attain the legal status of husband and wife. Different localities have different forms of the institution, the most broadly marked of which are connected with the right of a man to have only one wife, *monogamy*, his right to have several wives, *polygamy*, or the right of one woman to possess several husbands at one time, *polyandry*. Marriage is now commonly regarded as a civil contract and is held to be valid only when both parties are able and willing to contract according to certain established forms. In the Roman Catholic Church, marriage is considered a sacrament. The Church does not deny the validity of marriage as a civil contract, but it does deny the validity of a divorce.

The laws in relation to marriage in the United States are founded mainly on the laws of England. Though the different states have different statutes on the subject, most of them requiring ceremony in the adoption of the relation, there is a consensus of intent that no specific form in marriage is necessary, if the consent of the parties is proved. The old common law marriage of England, which was evidenced by declared intention and acknowledgment in connection with cohabitation, is valid in most states of the Union. In some states epileptics, feeble-minded and other defectives may not legally marry, and in some marriage between first cousins is forbidden. Each state fixes the age of consent, and there is no uniformity of legislation in this respect, though there has recently been a movement toward raising this age, and in most states it is now either sixteen or eighteen years.

The peculiarly sacred character of marriage has distinguished the marriage contract, in the eyes of the law. It cannot be set aside or abrogated by consent of the parties, nor on proof of fraud, except in rare cases. See **DIVORCE**; **HUSBAND AND WIFE**.

Morganatic Marriage, a term applied to marriage between a member of a royal house and a woman of inferior rank, when the law requires marriage between equals. The children of such a marriage cannot inherit the father's public position nor the family property. In some cases the wife and children receive titles of nobility.

MARS, *mahrz*, the fourth planet from the sun, the next to the smallest in size, and the

one most interesting to inhabitants of the earth because it is more like the earth than any of the other planets. Numerous speculations concerning life on Mars open up a very fascinating field for study, but the question as to whether people inhabit that planet cannot be answered with certainty. In his interesting *War of the Worlds*, H. G. Wells imagines the earth invaded by gigantic Martians, but this book, like other stories based on the subject, is pure imagination.

Facts about Mars. We know for a certainty several interesting things about this planet, whose name is that of the Roman god of war. It shines with a reddish light, and was the symbol of war to the ancients, who attributed to its influence many disturbing happenings. Once about every sixteen years Mars and the earth are separated only by 35,000,000 miles, and at such times all possible observations are taken of the ruddy planet. In 1909, the most recent year of approach, Mars shone so brightly that it was more than once mistaken for a light on an airship. When farthest away it is about 244,000,000 miles from the earth.

Mars moves round the sun in a little more than 686 of our mean solar days, at an average distance of about 140,000,000 miles, its greatest distance being 152,000,000 miles, and its least, 126,000,000. It rotates on its axis in 24 hours, 37 minutes, 22 seconds, and has a diameter of about 4,230 miles, as compared with about 8,000 miles for the earth. As it takes Mars about two years to complete its revolution round the sun, the seasons on the planet are similar to our own, but are about twice as long.

The volume of Mars is about one-seventh that of the earth, and its gravitation is only about one-third. A weight of three pounds on the earth's surface would therefore weigh but one pound on the surface of Mars. In 1877 two satellites were discovered by Professor Hall of the Naval Observatory, Washington. These are among the smallest of the heavenly bodies, and the larger and outer one, called Deimos, is supposed to be only about seven miles in diameter. Deimos revolves about the planet in a period of thirty hours, and the inner one, Phobos, which is five or six miles in diameter, revolves about it in seven hours, thirty-nine minutes.

Peculiar Markings. Through the telescope Mars appears to have a yellowish surface,

marked with indistinct and irregular gray patches. Under a stronger telescope the irregular patches are shown to be connected by gray lines which intersect in every direction. These patches and lines are constant, and maps have several times been made of them. For a long time it was thought that the gray tract and lines were water, and the lighter portions, land; but now it is quite certain that both are solid, as the surface of both is irregular, often mountainous. It is thought that water cannot exist upon the planet because the atmosphere, which is thin and light, contains little or no moisture. White caps have also been observed at both poles, which disappear during the Martian summer. Some authorities believe them to be great fields of ice and snow; others regard them as formations of condensed gases.

Canals on Mars. In 1877 an Italian astronomer announced his observation of a network of straight lines on the planet, hundreds of miles in extent. Many later astronomers have made studies of these lines, and Professor Percival Lowell worked out an elaborate theory as to their being vast irrigation canals, built for the purpose of conducting melting water from the polar regions over the planet. This theory presupposes an advanced stage of civilization on Mars, and beings possessing a knowledge of engineering. Like other speculations on this subject it can neither be proved nor disproved.

Related Articles. Consult the following titles for additional information:

Astronomy	Mars (war	Satellite
Earth	god)	Solar System
	Planet	

MARS, the Roman god of war, called by the Greeks, Ares. He was the son of Jupiter, and like him he was often called *father*, especially by the Romans, who regarded his son Romulus as the founder of their city. He was a fierce and terrible god, who delighted in the rush and noise of battle, and from him kindnesses were never expected. That he was not, however, absolutely unable to feel any softer emotions was shown by his love for Venus. Although he was the god of war and was able to protect his favorite warriors, he himself was not invulnerable, but was wounded at various times. Mars was greatly feared, and human sacrifices were sometimes offered on his altar.

MARSEILLAISE HYMN, *mahr sel ayz'* (in French, *mahr say yayz'*), the stirring national anthem of the French people, so called

because it was first sung in Paris by volunteers from Marseilles. The words and music were composed in April, 1792, by Rouget de l'Isle, an officer stationed at Strassburg. A company of volunteers were about to leave that city to take part in the war of the Revolutionists against Austria and Prussia, and young de l'Isle was asked by the mayor of the city to write a song to be sung at a farewell banquet in their honor. The hymn proved a wonderful inspiration to the soldiers, and was called by its composer *War Song of the Army of the Rhine*.

The present name was given it when the Marseilles volunteers sang it in Paris while marching to the attack on the Tuileries. Not only in France but in many other countries is the *Marseillaise* sung on patriotic occasions. The following words—a free translation of the first stanza—are the ones most often sung in America:

Ye sons of France, awake to glory,
Hark! hark! what myriads bid you rise!
Your children, wives, and grandsires hoary,
Behold their tears, and hear their cries!
Behold their tears, and hear their cries!
Shall hateful tyrants, mischief breeding,
With hireling hosts, a ruffian band,
Affright and desolate the land,
While peace and liberty lie bleeding?
To arms, to arms, ye brave!
Th' avenging sword unsheathe!
March on, march on, all hearts resolved
On liberty or death!

MARSEILLE, *mahr sayl'*, FRANCE, the second city of the republic in size and its principal seaport, is situated on the Mediterranean Sea, on the Gulf of Lyons. It has a beautiful location, for hills from 1,200 to 1,750 feet high rise back of the seashore in a semi-circular form as a background, and the city has encroached on their slopes. For the last hundred years the town has been worthy of the best traditions of city building; previously it was ill-kempt and of little importance. It dates back to a Greek settlement about 600 B. C., but there are few reminders of its ancient existence.



MARS

A statue in Villa Ludovisi, Rome.

The manufacturing interests are large. Here are the greatest soap factories of France; the city is noted for its automobile works, the construction of steam engines, the refining of sugar and the production of petroleum, candles, macaroni, oil, flour and clay products. Its seaborne commerce has made Marseilles great, particularly since the opening of the Suez Canal. There are twelve miles of wharfs, and a recently constructed canal to the river Rhone gives it water connection with the interior. The national hymn, *The Marseillaise*, was named for the city, because it was first sung by troops from here. Population, 1931, 800,880.

MARSH, a tract of wet land, partially or wholly covered by water. Marshes are formed by springs or rivulets, the flow of whose outlet is obstructed. They may occur on slopes, but are usually found on low and nearly level lands, and they are frequently extensive in alluvial plains along the lower courses of rivers. Salt marshes are found along the shore of the ocean, where the land is low and nearly level. Marshes on hillsides often constitute bogs (see **Bog**) and quagmires. Sometimes such marshes loosen the soil and cause landslides. Many marshes are the site of peat bogs, and most of them contain more or less muck (see **PEAT**). Good illustrations are the cypress swamps along the Mississippi River in Mississippi and Louisiana.

The reclamation of marshland by drainage is important to agriculture, since rice is the only outstanding crop that grows in water. The drainage of the Everglade swamps in Florida and the reclamation of the historic Pontine Marshes in Italy are well-known projects of this type. From ancient times attempts were made to drain the Pontine area, stretching southeastwardly from the Roman plain to the sea. After the organization of the government under Mussolini, the work was undertaken in earnest, and the former wasteland has been transformed into a prosperous region of motor roads, farms and towns.

MARSHAL, *mahr'shal*, a word of German origin, signifying originally a man appointed to take care of horses, but which, because of its association with the cavalry, became a high military title. The title of marshal in the German Empire had its origin in a similar title under the Frankish monarchs. In France *marechal de France* is the highest

military honor. The title was conferred on Foch, Joffre and Pétain, in recognition of their leadership in the World War. In Germany *general field marshal* was the highest military honor to the end of the World War. In Great Britain *field marshal* is the highest military rank. Among others, the title was borne by French, Haig and Allenby. In the United States a marshal is an executive officer connected with the Federal courts. The same name is popularly applied to the chief police officer of a village or small town.

MARSHALL, JOHN (1755-1835), the most famous Chief Justice of the American Supreme Court, born at Germantown, Va. He lived in a frontier community and was educated by tutors, among whom was his father. Marshall served four years in the Revolutionary War. In 1780 he attended a course of lectures under the chancellor of William and Mary College, and was admitted to the bar in Fauquier County. While engaged in the practice of law, he was elected to the state assembly of Virginia (1782), and was several times reelected. In 1787, during the debates on the Federal Constitution, before its submission to the state convention, Marshall presented the theory that all laws of Congress should be subject to review by the judiciary, a principle that ultimately prevailed. As a member of the Virginia convention he and Madison were outstanding in support of ratification. Marshall reentered public life in 1797, when he was sent with Gerry and Pinckney to settle several points of dispute with France. In 1798 Marshall was elected to Congress, became Secretary of State in 1800 and from 1801 till his death was Chief Justice of the United States Supreme Court. In this office he proved himself one of the greatest of the world's jurists, and several of his decisions established extremely important points of interpretation of the Federal Constitution. (For an account of the most noted decision which he handed down see **DARTMOUTH COLLEGE**.) When he died the nation mourned, and the Liberty Bell in Independence Hall was tolled in his honor during his funeral ceremony, July 8, 1835 (see **LIBERTY BELL**).

MARSHALL, THOMAS RILEY (1854-1925), a lawyer and statesman and Vice-President of the United States, was born at North Manchester, Indiana. He was graduated at Wabash College in 1873, and two years later was admitted to the bar. He was elected gov-

ernor of Indiana in 1909, and in 1912 was chosen Vice-President of the United States on the Democratic ticket. In 1916 he succeeded himself in that office, serving until 1921. Marshall was the fifth man in American history to serve two terms in the Vice-Presidency.

MAR'SHALLTOWN, IOWA, the county seat of Marshall County, sixty miles northeast of Des Moines, on the Chicago Great Western, the Minneapolis & Saint Louis and the Chicago & North Western railroads. The city is in a stock raising and agricultural region. It contains grain elevators, flour mills, glucose works, packing houses, machine shops, heating specialty factories and railroad shops. The state soldier's home is located here, and the city has a Memorial Coliseum, a Masonic Temple and a Carnegie Library. The first settlement was in 1860; a charter was granted in 1868. There is mayor and council government. Population, 1920, 15,731; in 1930, 17,373, a gain of over 10 per cent.

MARSH GAS. See METHANE.

MARSH HAWK, or **HARRIER**, a fine, light, bluish-gray hawk, that hunts over marshy regions and wet grounds. It is a long-winged bird, capable of strong flight; it should be favored by agriculturists, because of the great numbers of insects and troublesome small animals it destroys. In the spring the male may often be seen performing marvelous aerial evolutions, sometimes almost at the surface of the ground and again far up in the air, in his efforts to attract the female.

MARS HILL, a rocky hill in Athens on which were held the meetings of the Areopagus (which see), the oldest justice court of the Athenians. The hill of Mars, or Ares, lay west of the Acropolis. Paul preached to the Athenians on the hill, as is related in *Acts XVII*. The origin of the name is unknown.

MARSH MAL'LOW, a common plant of the mallow family, growing in great abundance in marshes, especially near the sea. It is perennial and has a white, fleshy, carrot-shaped root, which is used in making marsh-mallow confectionery and in the preparation of a soothing medicine. The stem is from two to three feet high. Both leaves and stem are covered with soft down, and the flowers are a delicate flesh-color.

MARSTON, *mahr's'ton*, **MOOR**, a locality in Yorkshire, England, about seven miles west of York, celebrated for the battle between

royal forces, under Prince Rupert, and troops of Parliament, under Fairfax and Cromwell, including the famous Ironsides brigade, July 2, 1644. The royal forces were routed, and the Cromwellians gained control of all of Northern England.

MARSUPIALS, *mahr su'pi alz*, or **MARSUPIALIA**, *mahr su pi a'li a*, an order of mammals confined almost wholly to Australia and America. Marsupial animals live in trees, on the ground or, in a few instances, in water. They are generally like the other mammals, but differ in one striking peculiarity; the young are born in an immature state and are placed immediately by the mother in a pouch, where they attach themselves to the nipples and remain until fully developed. The pouch is permanent and differs in many respects from the temporary pouch of the duck-billed platypus, in which the young are hatched from eggs. The young marsupials remain in the pouch until they are clothed with fur and are able to care for themselves, but for some time after they are able to move about they return to the mother's pouch as a refuge. The only marsupial found in America is the opossum.

Related Articles. Consult the following titles for additional information:

Bandicoot	Koala	Tasmanian
Kangaroo	Opossum	Wolf
		Wombat

MARTEN, *mahr'ten*, the name of several flesh-eating animals, whose fur is a valuable

material for warm outer garments. The body of the marten, like that of the weasel, is elongated and slender. The legs are short, and the feet are provided with five toes, armed with sharp claws. In habit, martens differ from weasels in living in trees, which they climb with great ease. The



MARSH MALLOW

pine marten is found chiefly in Great Britain and Europe. It is of smaller size than the

common marten, is of a dark-brown color, with a yellowish mark on the throat, and has fine fur, which is largely used in commerce for trimmings for clothing. The famous *sable marten*, which furnishes the valuable sable fur, inhabits Siberia, and is nearly allied to the pine marten. *Pennant's marten*, or the *fisher*, as it is popularly called, is another well-known species. See FUR AND FUR TRADE.

MARTHA'S VINEYARD, *vin'yard*, a wooded island off the southern coast of Massachusetts, forming the principal part of Dukes County. It is about four miles south of the mainland and is twenty-three miles long and from two to ten miles broad. It has a permanent population of about 5,000, but there is a large transient population in the summer.

MARTIAL, *mahr'shal*, in full, MARCUS VALERIUS MARTIALIS (about 40—about 104), a Roman writer of epigrams, born at Bilbilis, in Spain. He went to Rome when young, during the reign of Nero, and lived there under Galba and the following emperors. Domitian gave him the rank of tribune and the rights of the equestrian order. In the year 100 he returned to Spain, to his native city, where he died. His fame rests on fourteen books of epigrams, which for the most part depict with remarkable good sense and pungent wit the life of imperial Rome.

MARTIAL LAW, or military law, is the law by which the discipline of an army is maintained. Under special circumstances of insurrection or rebellion, or serious local riot, where the civil law is insufficient to protect life and property, it is sometimes necessary to administer the law by an armed force of soldiers or militiamen, called at the request of civil authorities, who occupy the disturbed district. Military law is then above the civil ordinances, and every order of the military authorities must be obeyed. See RIOT.

MAR'TIN, a large swallow, common in North America, where it is widely distributed throughout the summer. It winters in Central and South America. The male is a beautiful purplish-blue, and from its large size and vigorous flight it is a conspicuous bird wherever it lives. The martins have become thoroughly accustomed to the presence of man, and they build freely in bird houses or even in the crevices and under the eaves of inhabited buildings. Four to six glossy white eggs are laid, and there are two broods during a season. There are several species

of true martins, a name which unfortunately is locally given to other birds; for instance, the kingbird is sometimes called the bee martin.

MARTINIQUE, *mahr te neek'*, one of the French West India Islands, belonging to the Windward group, thirty miles nearly south of Dominica. The island is about forty miles long and ten to fifteen miles wide, and has an area of 385 square miles. The form is irregular and the coasts are rugged, while the surface is rough and mountainous, culminating in Mont Pelée, which has an altitude of 4,500 feet. Like the other islands of the group, Martinique is of volcanic origin. The climate is humid, but not unhealthy. The principal products are sugar cane, coffee, cocoa and tropical fruits.

Martinique was discovered by Columbus, and in 1635 it was settled by the French. In 1902, in May and in August, occurred destructive eruptions of Mont Pelée, which destroyed the city of Saint-Pierre, until that time the largest and most important city on the island, and killed from 30,000 to 35,000 people. Population, 1931, 234,695.

MARTYRS, a name applied by the Christian Church to those persons who, in the early ages of Christianity and during the great persecutions, suffered ignominy and death rather than renounce their faith. Festivals in honor of the martyrs seem to have been observed as early as the second century. The Christians offered prayers at the tombs of the martyrs, thanked God for the example which they had given to the world, delivered eulogies, read accounts of the lives of the deceased and concluded the rites with the sacrament of the Lord's Supper and the distribution of alms.

True martyrs have ever gone to their deaths in an exaltation of spirit and a holy gesture of self-sacrifice that stirs religious feeling in every generation that follows. To give up life, usually in the throes of inexpressible anguish, is a mark of devotion to an ideal that moves the thoughtful to vivid understanding of some higher meanings of life and service. The crown of martyrdom has not missed the brow of many unworthy in the true sense to wear it. Fanatics in emulation of better men have died in support of their personal emotions, but even here there has been shown a willingness to suffer torture, even if in a drama of misdirection. The line that divides highest purpose from mistaken

zeal is often difficult for even the thoughtful person to distinguish.

The thought of martyrdom of holy men suggests in these latter days a striving for the betterment of mankind on the part of every sincere individual; a course of life not directed always in easy channels of acceptance of things as they are, but motivated to oppose with patience and understanding whatever works to the undoing of man.

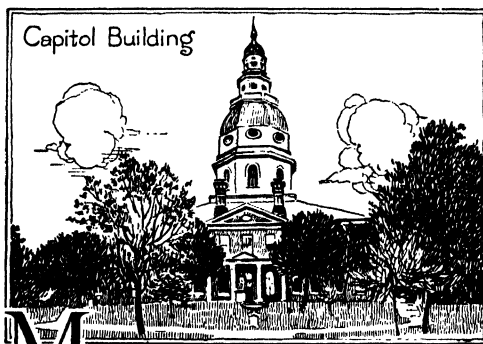
MARX, *mahrks*, KARL (1818-1883), a German economist whose theories have been adopted by modern Socialists. He was born at Treves, of Jewish parentage, and studied law and philosophy at Berlin. After editing a liberal paper at Cologne from 1841 till its suppression, he went in 1844 to Paris, where he took part in the publication of the *Deutsch-Französische Jahrbücher* and a liberal newspaper. In 1845 he was compelled to flee to Brussels, and he there became head of the central committee of the Socialists. Banished from Germany, he went in 1849 to London, which was his home from that time. In 1864 he established the International Workingmen's Association, which for a time had wide influence. Lenin and Trotzky in their organization of Russia into a dictatorship of the proletariat based their new Soviet structure on the teaching of Marx; Communists throughout the world accept Marxism in its entirety. His chief work is *Das Kapital* ("Capital"), which is the textbook of modern scientific socialism. See SOCIALISM.

MARY I (1516-1558), queen of England, daughter of Henry VIII by Catharine of Aragon. She ascended the throne on the death of Edward VI, in 1553, after an attempt to set her aside in favor of Lady Jane Grey. One of her first measures was the restoration of the Roman Catholic prelates, who had been superseded in the late reign, and the suppression of all changes in the Church. Her marriage to Philip II of Spain, united as it was with a complete restoration of the Catholic worship, produced much discontent. Under Philip's influence a war began with France, which ended in the loss of Calais in 1558, after it had been in the hands of the English for more than 200 years.

MARY II (1662-1694), queen of England, the daughter of James II of England. She was married in 1677 to William, Prince of Orange, and when the Revolution dethroned her father, Mary was declared joint possessor

of the throne with William. See WILLIAM III.

MARY, THE VIRGIN, the mother of Jesus. The story of her life, so far as it is given in the New Testament, begins with her betrothal to Joseph and the narrative of the birth of Christ. She is thrice mentioned during Christ's public ministry and once after His death. A tradition asserts that she lived and died at Jerusalem, under the care of John; another that she died at Ephesus, to which she and John had retired from the siege of Jerusalem. She is a perfect type of Christian womanhood, and as the Madonna has been pictured by some of the world's greatest painters. See MADONNA.



MARYLAND, called the OLD LINE STATE, because of the valiant defense put up by the Maryland Line in the Battle of Long Island, lies south of Pennsylvania, west of Delaware and the seaboard, and north of Virginia and West Virginia. It is one of the original thirteen states of the American Union. On the south its boundary is very irregular, being formed by the winding Potomac River. At one point in the western section the state is only two miles wide. The area is 12,327 square miles; of this, 2,386 square miles are water, comprising Chesapeake Bay and numerous rivers. The population in 1930 was 1,631,526, with a density of 164.1 persons to the square mile, more than four times the average for the United States. The state flower is the black-eyed susan named by majority vote of the legislature.

Surface and Drainage. Chesapeake Bay and the Susquehanna River divide the state into two parts, known as the eastern and the western shores. The eastern division is low, nearly level, sandy and fertile. In the north the surface of this division is diversified by a

number of low, rounded hills. The western portion of the state is crossed by the Blue Ridge, the central Appalachian and the Alleghany Mountains, making this region decidedly mountainous, though there are no high altitudes, the highest peaks reaching 2,500 and 3,000 feet. The highest point in the state is Eagle Rock, 3,162 feet, in the extreme southwest. The ranges are nearly parallel and are separated by deep valleys, and the entire region wooded. The portion of the state lying between the mountains and Chesapeake Bay is rolling and hilly. The mountainous region is celebrated for its beautiful scenery.

The Potomac, flowing along the western and southern borders, is the largest river within the state. The longest stream of importance is the Susquehanna, which crosses the state from the north. Other streams are small, except at their mouths, where many of them have estuaries. Flowing into Chesapeake Bay on the west are the Pawtuxent, the Patapsco, the Gunpowder and the Susquehanna. On the east are the Elk, the Sassafras, the Chester, the Choptank and a number of others. The important tributaries of the Potomac are the Monocacy, the Antietam and the Youghiogheny.

Climate. The climate is mild and healthful. The mean summer temperature is 75°, and the mean winter temperature, 34°. No section is free from snow, and cold waves of short duration occur during the winter months. The average annual rainfall in the western portion is thirty-eight inches, and near the Atlantic coast it is forty-six inches.

Minerals. Coal is the most important mineral product, and is found in three regions in the northwestern section; these are known respectively as the Cumberland, the Georgia Creek and the Frostburg area. The veins vary from one to fourteen feet in thickness, and they yield the best quality of bituminous coal. The annual output is always close to 3,000,000 tons. Limestone is generally distributed throughout the central part and granite and marble of excellent quality are found near the head of Chesapeake Bay. Stone from these quarries has been quite extensively used in public buildings in Washington and for important structures in New York and Philadelphia. Clay suitable for the manufacture of pottery and brick and an excellent quality of kaolin are found in the central part of the state.

The clay products are next to coal in annual value. Slate, chrome and hydraulic cement also occur in paying quantities.

Fisheries. The oyster beds of Chesapeake Bay are famed for their size and the excellent quality of their product. Oyster fishing is one of the important industries, and in output exceeds any other state, nearly 6,000,000 bushels a year being marketed. The area of the oyster beds exceeds 200 square miles, and during the season over 7,000 small vessels are employed in dredging, scraping and tonging for oysters. Shad, menhaden, mackerel and crabs are also taken in large quantities.

Agriculture. The eastern shore, or that portion of the state between Chesapeake Bay and the ocean, is remarkably well suited by soil and climate to the growth of fruit and vegetables, and a large part of this region is devoted to these branches of agricultural industry. Truck farms and fruit orchards prevail. The northern part of the state is well suited to growing wheat, corn, Irish and sweet potatoes, with tobacco in the south. The most important crops are corn, wheat, hay, oats, tobacco and potatoes. In the region adapted to grazing, considerable numbers of horses, mules and cattle are raised, and dairy farming is practiced.

Manufactures. Maryland was not essentially a manufacturing state until the growth of industry in and near Baltimore raised it to a place of importance. The value of products has steadily increased. There are nearly 3,500 factories in the state, and their product is valued at about \$800,000,000 a year. The leading industries are the canning and preserving of oysters and other shellfish, the preparation of tobacco, slaughtering and meat-packing, the production of iron and steel and foundry and machine-shop products, shipbuilding and the manufacture of textiles. Baltimore alone produces goods worth \$650,000,000 a year.

Transportation and Commerce. While the Atlantic coast has no good harbors, the coast of Chesapeake Bay affords many excellent harbors for vessels of light draft, and that of Baltimore is open to the largest ocean steamers. That city has become a great ocean port. The Potomac is navigable as far as Washington, 125 miles. The Baltimore & Ohio, the oldest railway in the country, has lines connecting Baltimore with Philadelphia and Washington and also with the Ohio val-

ley. The Pennsylvania system, the Western Maryland and the Philadelphia, Baltimore & Washington, traverse the state. The Chesapeake & Ohio Canal, extending to Cumberland, has not been maintained as a common carrier since about 1925. The Chesapeake and Delaware canal is in operation. There are 1,433 miles of railroad, and 657 miles of electric lines.

Government. The legislature consists of a senate of twenty-nine members and a house of delegates of 118 members, apportioned among the counties according to population. The members of the senate are elected for four years; the terms of one-half expire every two years. The members of the house of delegates are elected for two years. The legislative sessions are biennial, and are limited to ninety days.

The executive authority is vested in a governor, who is elected for four years; an attorney-general, elected for four years, and a comptroller of the treasury, elected for two years. A treasurer is elected on joint ballot by the legislature, for two years. The highest court is a court of appeals, composed of the chief judges of the seven country circuits and the circuit of Baltimore. In each circuit except that of Baltimore, the chief judge and two associates are elected, and they must hold court in each county of the circuit. These courts have both civil and criminal jurisdiction in important cases and are courts of appeal from cases arising in courts of the justices of the peace.

Education. Illiteracy of 11.1 per cent in 1900 dropped to 3.8 per cent in 1930. The public schools are in charge of a board of education and a superintendent of public instruction appointed by the board. The governor appoints school commissioners for each county, and the county commissioners appoint school trustees for the districts. The law requires ten months of school in each district whenever it is possible for a term of that length to be sustained. Separate schools are provided for white and colored children.

The state normal colleges for whites are at Salisbury, Towson, and Frostburg. The important higher institutions of learning are Johns Hopkins University at Baltimore, the University of Maryland at College Park and Baltimore, and in the latter city also are Goucher College, College of Notre Dame of Maryland, Loyola College, St. Mary's Seminary and University. Maryland College for

Items of Interest on Maryland

The state is famous for its song birds; of these the best known are the mocking bird, the cardinal bird and the Baltimore oriole.

The climate of Maryland in the southeast is influenced by the presence of the bay and ocean, while in the west it is influenced by the mountains; in the eastern and southern parts the normal winter is mild, the normal summer rather hot; in the west the winter is generally cold, the summer cool.

The great variety of soils is one of the features of the state, almost every possible mixture being found.

In no other state except South Carolina is so large a percentage of the value of the crop spent for fertilizer.

Nearly all the high-grade black-smithing coal mined in the United States come from Maryland.

The iron ore deposits, once the most important in the United States, are now comparatively insignificant.

Maryland cans a larger amount of tomatoes and sweet corn than any other state; in the production of all canned fruits and vegetables it stands second only to California.

The Jacob Tome Institute, at Port Deposit, is one of the most richly endowed secondary schools in the world.

Questions on Maryland

What is the area of Maryland?
What part of it is water?

Name some well-known song birds found in the state.

What are the principal crops? What part of the total do vegetables form?

How do the oyster fisheries rank?

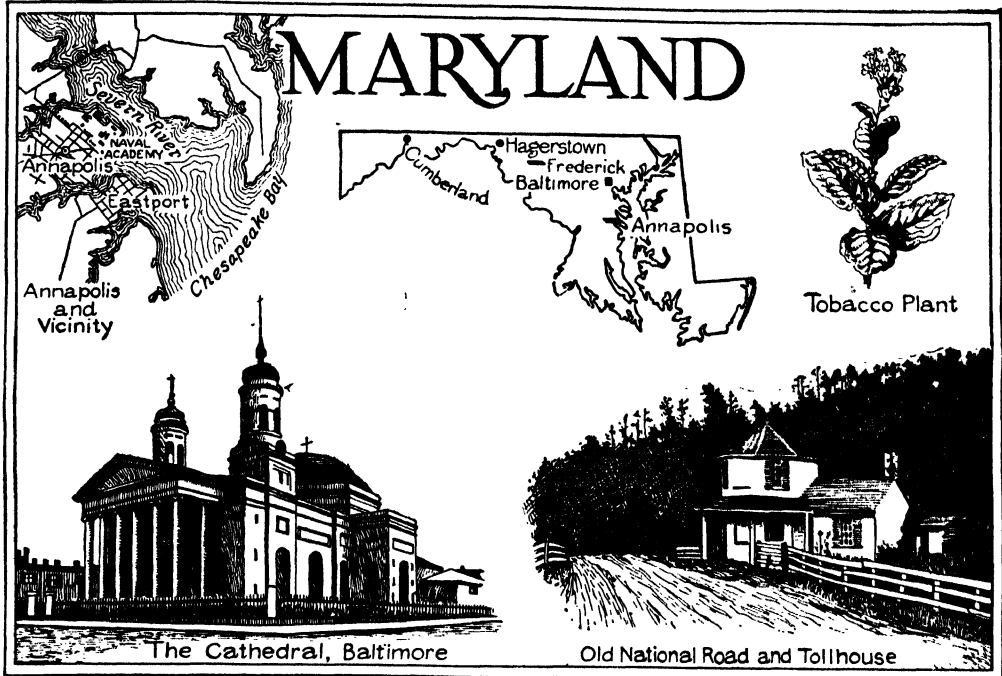
What is the most important mineral product? Where is most of it found?

Name five important manufactured products.

How many miles of railroad are there in Maryland?

What advantages in transportation facilities has Baltimore?

What are some of its leading industries? In what product does it lead all other cities in the Union?



Women is at Lutherville; Hood College (for women), at Frederick; Mount St. Mary College (for men) at Emmettsburg; St. Johns College (for men), at Annapolis; Washington College, at Chestertown; Western Maryland College, at Westminster. The normal school for negroes is at Bowie.

Institutions. Schools for the blind and deaf are located at Baltimore and for the deaf at Frederick. The school for feeble-minded children is at Owings Mills; the hospitals for the insane are at Sykesville and Spring Grove. The penal institutions include the state penitentiary at Baltimore, a house of refuge for boys and one for girls.

Cities. There are but six cities in Maryland with more than 10,000 people each. These are, in order of size, Baltimore, Cumberland, Hagerstown, Frederick, Annapolis, and Salisbury. Annapolis is the state capital.

History. Maryland was first settled in 1634 by the English, under the auspices of Cecilius Calvert, Lord Baltimore, of England. It was established through the effects of George Calvert, first Lord Baltimore, was intended to be a refuge for persecuted Catholics of England, and was the home of religious toleration from its foundation. Its early history was disturbed by conflicts between the proprietary party and Virginian

traders, the former finally being successful. Another trouble was the boundary dispute with the heirs of William Penn, which was finally decided in 1767 by the establishment of Mason and Dixon's Line.

In the pre-Revolutionary period, Maryland was aggressive in defense of colonial rights, and took a prominent part in the Revolutionary War. It was the last to adopt the Articles of Confederation, owing to its insistent demands that the large states relinquish their territorial claims in the northwest (see ORDINANCE of 1787). Maryland adopted the Federal Constitution April 28, 1788. The first half of the nineteenth century witnessed marked progress through the establishment of an elaborate policy of internal improvements, including canals, railroads and telegraph lines. During the Civil War Maryland remained loyal to the Union, though a slave-holding state, but sent many soldiers to both armies. Since the close of the war Maryland has been a doubtful state politically, though usually favoring the policies of the Democratic party. In June, 1915, the "Grandfathers' Clause," so-called, was made applicable to cities, where the negro vote is heavy. In 1920 a state civil service law was passed to protect state employes who are appointed. In 1920 Maryland rejected the

Nineteenth (woman suffrage) Amendment; voted for the Eighteenth Amendment, and for the Twenty-first in 1933.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Annapolis	Frederick
Baltimore	Hagerstown
Chesapeake Bay	Potomac River
Cumberland	Susquehanna

MISCELLANEOUS

Grandfather's Clause	Mason and Dixon's
Johns Hopkins	Line
University	Oysters

MARY MAG'DALEN. See MAGDALEN, MARY.

MARY STUART (1542-1587), a famous queen of Scotland, known more commonly as MARY, QUEEN OF SCOTS. Her tragic story has been perpetuated in painting, song and drama. Mary was the daughter of James V by his queen, Mary of Lorraine, a princess of the family of Guise. Her father dying when she was a few days old, she was proclaimed queen, and the regency was, after some dispute, vested in the Earl of Arran. Mary was educated in a French convent, and in 1558 she married the French dauphin, afterward Francis II. He died seventeen months after his accession to the crown, and the young queen returned to Scotland. The calamities of Mary began with her marriage to her cousin, Lord Darnley, in 1565. Darnley was a Roman Catholic, and Mary had hoped that his influence might be of help to her in her claims to the English throne; but his weakness and profligacy soon won her contempt. He almost entirely alienated the queen by his complicity in the murder of Rizzio, Mary's Italian counselor, though a reconciliation seemed to be effected between them about the time of the birth of their son, afterward James VI of Scotland and I of England.

At the close of the same year, however, Darnley withdrew from the court, and in the meantime the Earl of Bothwell had risen high in the queen's favor. Darnley had fallen ill at Glasgow, and Mary visited him and took measures for his removal to Edinburgh. He was there tended by the queen herself; but during the absence of Mary at a masque at Holyrood, the house in which Darnley lay



MARY STUART

was blown up by gunpowder, and he was killed. The circumstances attending this crime were very imperfectly investigated, but popular suspicion pointed to Bothwell as the ringleader in the outrage, and the queen herself was suspected of complicity, suspicion becoming still stronger when she was carried off by Bothwell, with little show of resistance, to the castle of Dunbar, and was married to him. A number of the nobles now banded together against Bothwell, who succeeded in collecting a force; but on Carberry Hill, where the armies met, Bothwell was defeated. The queen was forced to surrender herself to her insurgent nobles, Bothwell making his escape to Denmark. The confederates first conveyed the queen to Loch Leven Castle. A few days later a casket containing eight letters and some poetry, all said to be in the handwriting of the queen, fell into the hands of the confederates. They were held to afford unmistakable evidence of the queen's guilt, and she was forced to sign a document renouncing the crown of Scotland in favor of her infant son and appointing the Earl of Murray regent during her son's minority.

After remaining nearly a year in captivity Mary succeeded in making her escape and made an effort for the recovery of her power. Defeated by the regent's forces, she fled to England and wrote to Elizabeth entreating protection and a personal interview; but this the latter refused to grant until Mary should have cleared herself from the charges laid against her by her subjects. For more than eighteen years she continued to be the prisoner of Elizabeth, and in that time the place of her imprisonment was frequently changed, her final prison being Fotheringhay Castle, Northamptonshire. She was at last accused of being implicated in the plot of Babington against Elizabeth's life, was tried by a court of Elizabeth's appointing and was condemned to be executed.

MASARYK, THOMAS G. (1850-), the first President of the Czecho-Slovak Republic, which came into being during the last phase of the World War and was recognized as an independent state by the allied governments early in the fall of 1918. Masáryk was born in Moravia, of humble parentage. In his boyhood he was apprenticed to a blacksmith, but succeeded in obtaining a university education, studying at Vienna and Leipzig. In 1879 he became a teacher of philosophy at the University of Vienna, and three years

later was appointed professor of philosophy at the University of Prague. Professor Masáryk was elected deputy to the Parliament at Vienna in 1891, where he was vigorous in his denunciation of the treatment accorded the Czechs, whom he represented. Resigning his seat in 1893, he devoted himself to the nationalistic Czech movement, which culminated in 1918 in the establishment of a new republic consisting of Bohemia, Moravia, Silesia and Slovakia (see CZECHOSLOVAKIA; WORLD WAR). He was considered by the Czechoslovaks as their President for life, but he resigned late in 1925, because of age.

MASCAGNI, *mahs kah'n'ye*, PIETRO (1863-), an Italian composer known chiefly for his popular and spirited opera *Cavalleria Rusticana*. He was born in Leghorn, of poor parents. An uncle helped to pay for his musical studies at the Milan Conservatory, but the young man did not remain there long, as he seized an opportunity to travel with an operatic troupe. In 1890, while he was struggling to make a bare living, he wrote the opera that won him lasting fame and the Prize of Rome. *Cavalleria Rusticana* is presented season after season to enthusiastic audiences, but the other works of the composer did not fulfil the expectations of his admirers. His critics say that he is lacking in technic and that the brilliance of his one marked success blinds the public to faults of workmanship. Mascagni's other operas include *Iris*, *Isobel* and *Parisina*.

MASEFIELD, JOHN (1875-), an English poet who has written in a fascinating way of the sea and has pictured with vivid realism the life of the poorer classes. He was born in England on a farm, and at the age of fourteen ran away to taste the joys of life on the sea. He traveled all over the world, gaining a wealth of experience that colors such fine sea poems as *Salt-Water Ballads*, *A Mainsail Haul* and *On the Spanish Main*. In the course of his adventures Masefield worked in a New York saloon, and he also mingled intimately with the people of the East Side London slums. He acquired firsthand knowledge of the sufferings and experiences of the submerged classes, and these experiences are reproduced with a relentless pen in *The Everlasting Mercy* and *The Widow in the Bye Street*. Masefield delivered a series of lectures in Canada and the United States in 1915-1916, arousing interest everywhere.

Masefield was appointed poet laureate of England in 1930. His writings show originality with mastery of form, and a highly developed critical faculty; his poems are redolent of the English soil. Many of his plays have been produced on the English stage.

MASHONALAND, *mah sho'nah land*, once an independent negro government in South Africa but since 1890 under British influence and now one of two provinces forming Southern Rhodesia (see RHODESIA), Matebeleland being the other. The natives are of the intelligent Bantu stock, and are peaceful and agriculturally inclined. There are nearly 500,000 natives and about 13,000 whites in the province.

MASK, a covering for the face, used either as a disguise or as a protection. Masks have been worn since ancient times, and their use in the drama originated in the festivities of the Greeks in connection with the processions and ceremonies attending the worship of Dionysus or Bacchus. In Greek tragedy, which grew out of this worship, masks were common from the first, and later they were used in comedy. They were sometimes only coverings for the face and sometimes covered the whole head. The head masks had huge open mouths, provided with metallic mouth-pieces for the purpose of strengthening the voice of the speaker, a device which was necessary because of the size of the ancient theaters. In the Roman drama, also, the mask was common. The use of masks at balls and masquerades originated in Italy, where the domino, or half-mask, was worn by the women and was especially popular.

MASON, JAMES MURRAY (1798-1871), an American who became famous in connection with the Trent Affair (which see), was born in Fairfax County, Va., and educated in the law at the University of Pennsylvania. He was elected to the state legislature, to the national House of Representatives for one term and finally to the United States Senate, where he served from 1847 to 1861. In the latter year he withdrew to assist the secession movement, having been a faithful advocate of the Southern cause and the author of the famous Fugitive Slave Law. In 1861 he was appointed representative of the Confederacy abroad, and, while sailing for Europe in the British steamer *Trent*, was captured with his colleague, John Slidell, and taken to Boston. After being released, he went to London, where he endeavored to win recognition for

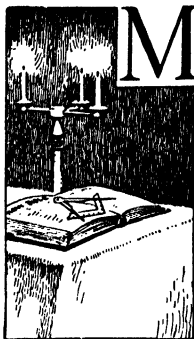
the Confederacy, but without success. He returned to America after the war and lived in Canada until 1868, when he removed to Virginia.

MASON, JOHN (1586-1635), an Englishman who in American history was the founder of New Hampshire. He received a patent (grant) of the territory when he was governor of Newfoundland, as a reward for a voyage of exploration along the coast.

MASON AND DIXON'S LINE, the line which separates the states of Maryland and Pennsylvania. From the time of the grant of the latter territory to William Penn in 1681, there were disputes between the family of Penn and that of the Lords Baltimore, the possessors of Maryland, as to the boundary between the two territories. An agreement was formed in 1763 by which the line was fixed by two English surveyors, Charles Mason and Jeremiah Dixon. Milestones, marked on one side with *M* and on the other with *P*, were set up along the whole of this boundary line. Mason and Dixon's line is commonly spoken of as the boundary between the *South* and the *North*, owing to the fact that it was, before the Civil War, the dividing line between the slaveholding and the free territory.

MASON BEE, a bee distinguished from others by the manner in which it constructs the small earthen cells in which it lives. These are made of sand, pebbles, chips, sawdust and other substances, firmly glued together and smoothed on the inside. They are usually made in groups of from ten to twenty. In these the larvae are deposited, with the honey and pollen stored for their food. These bees are of comparatively small size, are dark in color, and live in families instead of colonies. See **BEE**.

MASON CITY, IOWA., the county seat of Cerro Gordo County, ninety miles northeast of Fort Dodge, on the Chicago & North Western, the Chicago, Rock Island & Pacific, the Minneapolis & Saint Louis, the Chicago Great Western and the Chicago, Milwaukee, Saint Paul & Pacific railways. The city is in an agricultural and stock-raising region; contains clay and sandstone deposits and large cement works. It has a large trade in agricultural produce, groceries and fruits. There is a public library, a fine courthouse and an Odd Fellows' Orphans' Home. The place was settled in 1855. Population, 1930, 23,304.



MASONRY, or **FREE-MASONRY**, the names commonly applied to the most ancient secret organization in the world. It is, also, the largest in point of membership, is one of the most beneficial, and entirely without ostentation, probably the most influential. The members are known to one another as Free and Accepted Masons—in some jurisdictions, Ancient Free and Accepted Masons (A. F. A. M.).

Principles. The fundamental principle of Masonry is a declared belief in God and the acceptance of a Book of the Law, which among Christians is the Bible and among Jews is the Old Testament. No lodge can be opened unless the Bible lies open upon the altar. Masons are also expected to believe in the immortality of the soul and in the resurrection, and peculiarly impressive symbols are used to represent these principles. The order also inculcates moral principles, of which the chief are charity, truth, temperance and justice. Though in the constitution of the order there is no provision for the payment of set or regular dues for the relief of members or others, all Masons are expected to relieve to the extent of their ability brother Masons, their widows and orphans, when in distress.

There are various steps, or degrees, in Masonry, but three degrees only are required in order that a man may become a Master Mason. He is then as much a Mason as he ever can be. All further degrees are only added exemplification of the mysteries of Masonry.

History. According to legend the beginnings of Masonry can be traced as far back as the time of King Solomon. However its definite history is known to extend only to the sixteenth century. It is now believed to have arisen from the medieval guilds of masons and architects, the most skilled of whom had organizations, bound together by signs and passwords, which represented the secrets of their trade. However, it was not until the beginning of the eighteenth century that permanent lodges were reestablished upon the principles which form the basis of the modern organization.

There are bodies of Masons recognized by the organization in the United States, in Canada, England, Ireland, and in several of the countries of Continental Europe. French Masons are not in this fellowship, for since the French Revolution they have not restored to their order a belief in God.

In America there is a Grand Lodge in each of the States of the Union and in each of the provinces of Canada. Subordinate lodges are widely distributed. There are also Grand Lodges in Alaska, Porto Rico and the Philippine Islands, and in the States of Australia and in New Zealand. The total membership in the order in all parts of the world in 1933 (January) was 4,304,000; of this total, 3,149,872 were in the United States, in 16,518 lodges.

MASONRY, STONE. Stone masonry is the foundation art of building, and it has been practiced from very ancient times. We look to-day upon wonderful modern examples of the stone-mason's art and marvel at the intelligence of man in this present age, forgetting that no modern constructor has been able to learn by what skilful means some of the ancients builded. The Egyptians piled such massive stones high up on the pyramids that we will never cease to wonder how they were placed there; at Baalbek, Syria, in the Temple of the Sun, were stones sixty feet long and twelve feet thick, fitted together so perfectly that the joints were not easily seen. The ancients by scientific methods attained massive effects, many of which were beautiful; modern men have forsaken the massive, and have added elements of beauty and a diversity not known in early days.

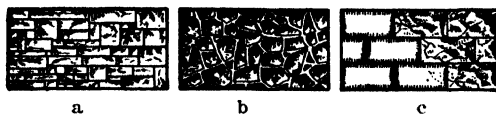
Even in this day of iron and steel construction stone masonry has lost none of its importance. Not only does it include construction in stone but in brick and concrete, as well; one form is present in every large building.

In building operations in stone the blocks usually are prepared at the quarries and need little if any alteration at the building site. The task of the mason is to lay them in place, and he is assisted by mortar mixers, carriers and helpers.

Classification. Masons and building contractors attach specific names to various styles of walls of stone. Some of these are described below:

Ashlar Masonry. Carefully squared blocks with smooth faces at all points of contact with

each other comprise ashlar masonry. If the exposed faces are also smooth the effect is known as smooth, or perfect, ashlar; if the faces are left slightly rough, the name rough,



VARIOUS FORMS OF MASONRY
a. Squared Rubble; b. Random Rubble; c. Smooth and Rough Ashlar.

or pitch-faced, ashlar, is applied. In ashlar masonry the stones are usually two or three times as long as high (see illustration).

Rubble Masonry. This style is more rustic in appearance. The stones are not smoothed, but weak corners and rough projections are removed. In laying, all interstices are filled with smaller stones and large pebbles and all are bound with mortar. The result is an uneven surface, but it is pleasing to the eye.

Random Masonry is a style in which the stones are squared but are not of uniform size, and therefore do not have the correct lined appearance of the ashlar masonry.

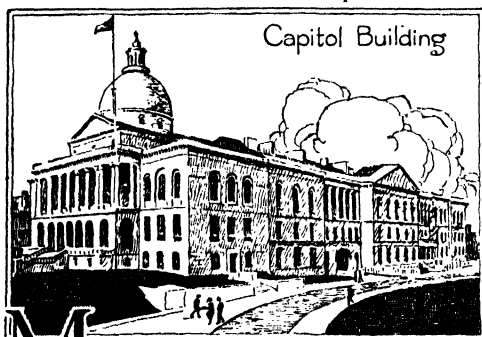
Brick Masonry. See BRICK AND BRICK LAYING.

Concrete Masonry. See CONCRETE.

MASQUE, or **MASK**, a dramatic entertainment much in favor in the courts of princes during the sixteenth and seventeenth centuries, particularly in England. In its earliest form it is perhaps best described as a masquerade, with an arranged program of music and dancing and a banquet. The first masque of this kind in England, according to Holinshed's *Chronicles*, was performed in the early part of the sixteenth century, and masques were frequently introduced into the plays of Shakespeare, Beaumont and Fletcher. The parts in the masques of the sixteenth and seventeenth centuries were usually taken by the first personages of the kingdom; at court the king, queen and princes of the blood often performed in them. Under James I the masque assumed a higher character, more care being expended in its preparation. In the writing of such works Ben Jonson takes an important place, his masques, despite much that is frigid and pedantic, having not a little genuine poetry. Milton's *Comus* is, from the literary point of view, the most beautiful of the productions which bear the name of masque, though it is possibly defective in the matter of spectacle and music.

MASS, in the Roman Catholic Church, the prayers and ceremonies which accompany the consecration of the eucharist, or all that part of the service in which the eucharist is offered. At present the mass consists of four chief parts, (1) the introduction, (2) the *offertorium*, or sacrifice, (3) the consecration, (4) the communion. These four chief parts, of which the latter three are considered the most essential, are composed of several smaller parts, each having its proper denomination. They consist of prayers, hymns, shorter and longer passages of the Holy Scriptures and a number of ceremonies, which, as the essential point of the mass is the sacrifice of the Lord, consist partly of symbolical ceremonies commemorative of important circumstances in Jesus Christ's life, or signs of devotion and homage paid to the presence of the Lord in the host. The order of these ceremonies, and of the whole celebration of the mass, is given in the missal, or mass book.

Mass can be offered only by a priest, and he must have fasted absolutely from the midnight previous till the morning of the service. Each priest may offer three masses on Christmas, but only one on other days, unless there be a lack of priests, when two masses may be offered on Sunday. *Votive mass* is an extraordinary mass, instead of that of the day, rehearsed on some special occasion. *Low mass* is the ordinary mass, performed by the priest without music. *High mass* is celebrated by the priest, assisted by a deacon and sub-deacon or other clergy, and sung by the choristers, accompanied by the organ and other musical instruments. A mass for the dead is called a *requiem*.



MASSACHUSETTS, *mas a chu'sets*, one of the leading manufacturing states in the Union, as well as one of the foremost in material and educational progress. It belongs to the New England group of states,

and in early American history was an influential and progressive colony among the original thirteen. The first permanent English settlement north of Virginia was founded in 1620 on a rugged coast of what was later popularly called the **OLD BAY STATE**, and from that date to the present this region has had an important place in American history. The beautiful bay on which the city of Boston is located suggested the popular name. Massachusetts is the name of a tribe of Indians of early colonial days. The state flower is the arbutus.

Location and Area. Massachusetts touches five states—Vermont and New Hampshire on the north, Connecticut and Rhode Island on the south, and New York on the west. The Atlantic Ocean forms all of its eastern and part of its southern boundary. Though it has an average width from north to south of only forty-eight miles, the eastern section expands irregularly, making the extreme northern and southern points about 110 miles apart. From east to west Massachusetts has an extent of about 184 miles. The state is about half the size of Switzerland, and of its total area of 8,266 square miles, 227 square miles are water. Among the states of the Union it ranks forty-fourth in size.

People. Massachusetts is exceeded only by Rhode Island in density of population, the average number of inhabitants to the square mile being 528.6 in 1930. According to the census of 1920 the population was 3,852,356. By 1930 the population had grown to 4,249,614 by the census of that year. The Irish are numerically the most important of the foreign-born inhabitants, and Canadians come next in order, but over forty races are represented in the population. It is a significant fact that 92.8 per cent of the people are to be found in cities, drawn there by great industries that abound in every municipality.

Surface and Drainage. The eastern part of the state is low, rising by slight undulations to a divide which separates the eastern tributaries of the Connecticut from the streams flowing into the Merrimac, or directly to the ocean. That portion of the state extending southward to Buzzard's Bay is especially low and sandy. An extension of this plain forms Cape Cod Peninsula, which is a distinguishing feature of the topography of the state. This encloses

between the bend and the main coast a large bay known as Cape Cod Bay.

The coast line, which is very irregular, has an extent of nearly 300 miles, not including the shore lines of the islands and smaller inlets. Among the excellent harbors formed by the many indentations are Boston Bay and Buzzards Bay. To the west of Buzzards Bay extensions of Narragansett Bay touch the state in two places. South and east of Buzzards Bay lie several islands, the most noted of these being Martha's Vineyard, Nantucket and the Elizabeth Islands. Besides these, there are many other islands along the coast. A ship canal across Cape Cod Peninsula, completed in 1914, connects Cape Cod Bay and Buzzards Bay.

This eastern slope culminates in the west in a plateau, which in some places attains an altitude of 1,100 feet. It occupies a large area in the central part of the state, and is a beautiful region, diversified by low ranges of hills which are outlying sentinels of the White Mountains, and by charming valleys in which are found many clear lakes and ponds with wooded shores. The beauties of Mt. Wachusett, with an elevation of 2,100 feet, are now secure in a state reservation. East of the Connecticut River the surface has a gentle slope; in the river valley are several low, isolated peaks, Mt. Holyoke and Mt. Tom being the most widely known.

West of the Connecticut River the surface rises to low mountains which, under the name of Berkshire Hills, cross the state from north to south. These are an extension of the Green Mountains and consist of two distinct ranges, the Hoosac Mountains and, farther west, the Taconic range, on nearly the western boundary of the state. These ranges are separated by deep valleys. This combination of hill, valley, stream and lake renders a large part of Massachusetts notable for the beauty of its scenery, and makes it unusually attractive as a summer and vacation resort.

All of the rivers have worn deep channels and flow through comparatively broad valleys. The Merrimac, watering the extreme northeastern part of the state, is navigable for about eighteen miles, but is chiefly important for its water power. Its important tributaries from Massachusetts are the Concord and the Nashua. In the southeastern part of the state, the Taunton, flowing into Narragansett Bay, is the most

important stream. The Connecticut crosses the state from north to south and is the largest river. It receives from the east Miller's, the Bachelor and the Chicopee rivers, and from the west the Green, the Deerfield and the Westfield. The Housatonic flows between the Hoosac and Taconic mountains southward into Long Island Sound, and the Hoosac, which rises in the northern part, flows in a northwesterly direction to the Hudson.

None of these streams is navigable except for small boats, but all of them, besides many smaller mountain streams, are important for the water power which they furnish, and the location of such manufacturing centers as Lowell, Lawrence, Haverhill, Waltham and other places is due to the falls in the streams where the towns are situated. The state contains a large number of small lakes, usually known as ponds. Industrially these are of little importance, but they add greatly to the beauty of the scenery, and some of them are sources of water supply for neighboring cities.

Climate. The climate is variable, especially along the coast, with prevailing southwest winds. In the mountainous regions, the winters are rather severe, with prevailing winds from the north and northwest and a comparatively-heavy snowfall; but in the interior, the temperature is more equable, and the seasons are less extreme. The temperature ranges from 20° below zero to 100° above; the mean annual temperature is 48°; the average rainfall, 44.99 inches.

Mineral Resources. Massachusetts is not rich in minerals, although it has alternated with Vermont in certain periods as the leading state in the production of granite. Hampden County, a little west of the center on the southern boundary, contains extensive quarries of sandstone. Limestone is quarried in the western part of the state and is used principally in the manufacture of lime. Clay suitable for brick, tile and pottery is quite generally distributed over the state, and in some localities there are valuable slate quarries. Emery is also found in profitable quantities, and in this mineral Massachusetts ranks first among the states. The other mineral products, of which there are a considerable number, are of less commercial value.

Fisheries. Massachusetts is one of the leading states in the catching and curing of fish, the total of fishery products landed at

Boston and Gloucester alone, in normal years, being in excess of 30,000,000 pounds. The total value for the entire state is about \$10,000,000. Many towns along the coast are devoted to this industry. Cod, halibut, haddock, swordfish, herring and mackerel are taken off shore in large numbers, while many fishing fleets make regular voyages to the Grand Banks for cod; Gloucester is the headquarters of the cod-fishing fleets. On the south coast oysters and other varieties of shellfish are found. At Woods Hole, on Buzzards Bay, are located a laboratory of the U. S. Bureau of Fisheries, and the Marine Biological Laboratory.

Agriculture. The valleys of the Connecticut, the Housatonic and other streams are fertile and well suited to agriculture, but the slopes of the mountains and parts of the hill country consist of a rocky, unproductive soil and are covered with trees, so that agriculture is not a leading industry in Massachusetts, although the state is dotted with a large number of small, well-tilled farms. Farming is largely confined to the production of milk, cream, garden truck and the raising of poultry, since these products are in great demand in the numerous cities in the state. Corn, oats, hay and tobacco are also produced, the last in an ever-increasing amount. Fruits, such as apples, pears, plums and peaches, are raised in abundance, but the state is especially noted for its cranberries, which are grown on the marshy lands in the southeastern part.

Manufactures. The abundance of water power and the excellent shipping facilities have combined to make Massachusetts one of the most important manufacturing states, and it is exceeded in this line only by New York, Pennsylvania and Illinois. Massachusetts leads all other states in the production of woolen goods, boots and shoes, and cordage and twine. It is second in cotton production. The great centers of cotton manufacture are Lowell, Fall River and New Bedford; Lawrence is an important center for the manufacture of woolen goods. The total output of the cotton and woolen mills is valued at about \$400,000,000 annually. The leading cities in the manufacture of shoes are Lynn, Brockton and Haverhill. Waltham contains the largest watch factory in the world. Boston, the largest manufacturing center, is characterized by a great diversity of products.

Machinery, tools, electrical apparatus and supplies, hardware and watches are also made in large quantities. Another important industry in which the state takes high rank is the manufacture of paper from wood pulp. The great paper mills at Holyoke and Fitchburg have attained a national reputation for the quality of writing paper which they produce, and much of the best book paper is also made within the state. Other industries of less magnitude, but still important, include the manufacture of rugs and carpets, silks, furniture, silverware and jewelry, and slaughtering and meat packing. The manufacturing centers are widely distributed over the state, though they are most numerous in the eastern portion. The value of the state's manufactured products annually exceeds a billion and a half dollars.

Transportation and Commerce. There are good harbors at Boston, New Bedford and Provincetown, which admit the largest ocean steamships. Railways extend through the state in every direction, so almost every town has railway communication. These lines either belong to, or are connected with, the great systems extending to the west and south and thus afford access to the great markets and sources of supply of raw materials in those regions. The chief railroad center of the state is Boston; Springfield and Worcester are also important. Within the state there are about 2,100 miles of steam railway. Local and interstate bus lines connect neighboring towns and the principal cities. Electric car lines serve the local needs in the larger cities. There are about 24,000 miles of public highways in Massachusetts. 14,500 miles are surfaced roads. The State Department of Public Works uses the income from the gasoline tax to develop a complete network of trunk highways throughout the state. Local cities and towns cooperate with the State Department in the building and maintenance of local highways.

The commerce of the state is very extensive, the foreign commerce being exceeded only by that of New York. Of this trade Boston is the great center, and it has direct steamer connection with many of the leading ports of Europe. Boston is not only the chief seaport of New England, but it has been for many years one of the principal outlets for the grain and meat of the West. The extensive commerce of Massachusetts is

Items of Interest on Massachusetts

Massachusetts has thirty cities of more than 25,000 inhabitants—a larger number than any other state.

Lexington, the scene of the first conflict in the Revolution, has many historical relics and buildings, including the Hancock House, now a museum, which sheltered Samuel Adams and John Hancock the night before the "nineteenth of April in Seventy-five," and likewise the old tavern frequented by the minutemen.

Concord, the oldest interior town in the state, was the scene of the defeat of the British on April 19, 1775; in later years it was the home of many celebrated writers and philosophers, including Emerson, Hawthorne, Thoreau, the Alcotts, Margaret Fuller Ossoli, and William Ellery Channing.

In 1639 the first printing press in America was set up in Cambridge.

The mines at Chester produce more emery than do those of any other state, while Massachusetts as a whole supplies as much emery as do all the other states together.

The first free school in America was established at Dedham, in 1644.

The leading technical schools are the Massachusetts Institute of Technology at Cambridge and the Worcester Polytechnic School at Worcester. The former is world famous.

The first college for women was founded at Mount Holyoke in 1837.

The white population of the state is divided about equally among native-born with native-born parents, native-born of foreign or mixed parentage, and foreign-born.

Cambridge, a suburb of Boston, was for years the home of Longfellow and Lowell. Craigie House, the Longfellow residence, is preserved as a memorial of the poet.

Tobacco has been raised in the Connecticut Valley since colonial days.

The Berkshire Hills region is sometimes called the "Lake Region of America." Mount Greylock, the highest ele-

vation in Massachusetts (3,538 feet), is in the northern part of the Berkshires.

The Roman Catholics outnumber all the Protestants combined. Of the latter the Congregationalists are the strongest. The Christian Science church has its headquarters in Boston.

Boston is the seat of the oldest historical society in America—the Massachusetts Historical Society. Its library possesses the Parkman collection of rare manuscripts relating to the history of the French in Canada.

The original site of Boston was a small peninsula called Trimountaine because of its three hills. The modern form of this word is *Tremont*.

The islands of Martha's Vineyard and Nantucket have the highest yearly average of wind velocity recorded in the United States—fourteen miles per hour.

Questions on Massachusetts

What other states are in the same degree of latitude? Longitude?

How does Massachusetts compare in size with Texas? California?

Name three important bays. What important cities are located on them?

What fish are principally caught? Where are the oyster beds?

Name five important articles of manufacture.

Locate and describe the Hoosac tunnel.

How does the population of Massachusetts compare with that of Texas? What is the population to the square mile?

For what is Plymouth celebrated? Concord? Lexington?

When and where was the first university founded in America?

Name some early leaders of the Pilgrims.

What important events at the beginning of the Revolutionary War took place in Massachusetts?

What six places in Massachusetts do you think would be the most interesting to visit?

due largely to the variety and extent of its manufactures. The imports consist largely of wool, hides, fibers and vegetable grasses and other raw materials for the factories, while the exports include cereals, cattle and dressed meats, lumber and cotton from the West and South, and fish and all lines of manufactured goods produced in the state.

Government. The legislature, known as the general court, consists of a senate of forty members and a house of representatives of 240 members, all elected biennially. The executive department consists of a governor, lieutenant-governor, secretary, treasurer and receiver-general, auditor, attorney-general, also elected biennially. The governor is assisted by a council of eight members, elected annually by districts. The judiciary department comprises a supreme court, with a chief justice and six associates, and a superior court, consisting of a chief justice and twenty-seven associates. The judges for these courts are appointed by the governor, with the advice and consent of the council. Below these are the municipal and police courts in Boston and large towns and the district courts. Counties have probate courts and courts of insolvency.

Local government is by township, and it was in Massachusetts that this peculiar form of government originated. The affairs of the town are in the hands of three or five officers, known as selectmen, who, together with other township officials, are elected at the annual town meeting, in which every voter of the town has the right to vote.

Education. The first free school (1635) and the first college (1636) in the United States were in Massachusetts. The state has not only the oldest, but one of the best systems of public schools in the Union (see MANN, HORACE). The governor appoints a state advisory board of education of six members and the commissioner of education, who is the executive officer of the department with supervisory powers over all the educational work supported in whole or in part by the state. Towns and cities having a valuation of more than \$2,500,000, with more than 12 schools, employ superintendents who devote their entire time to the local school work. Towns with a less valuation combine with other towns to employ a superintendent.

The state maintains a number of trade schools and special schools for instruction

in household arts. There are ten teachers colleges for the training of teachers. There is no state university, but there is a state college at Amherst. Chief among the higher institutions of learning are Harvard University, Amherst College, Williams College, Massachusetts Institute of Technology, Worcester Polytechnic Institute, Clark University (including Clark College), Boston University, Holy Cross College, Boston College and Tufts College. Among the colleges for women are Mount Holyoke College, Wellesley College, Smith College, Radcliffe College, which is closely allied with Harvard University, Wheaton College and Simmons College. In addition to these colleges and universities the state contains a large number of secondary schools, colleges and professional schools.

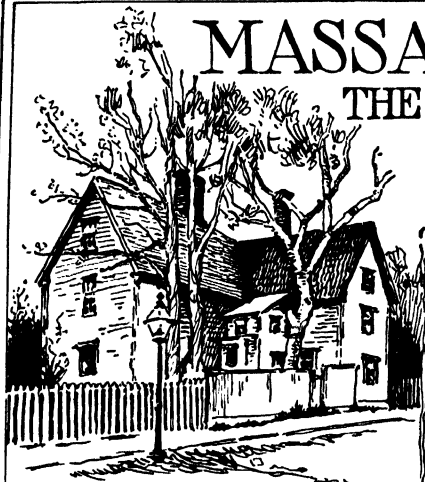
Institutions. The principal schools for the deaf are located at Boston, Northampton and Randolph. There is a large school for the feeble-minded at Waltham, and a hospital school for crippled children at Canton. The blind are educated at the Perkins Institution and Massachusetts School for the Blind in Boston. The hospitals for the insane are at Danvers, Medfield, Northampton, Taunton, Westboro and Worcester. There is a reformatory for men at Concord and one for women at Sherborn. The state prison is at Boston. Other institutions include a leper colony on Penikese Island; the state infirmary at Tewksbury, the state farm at Bridgewater, a hospital for epileptics at Monson, a prison camp and hospital at Rutland, a hospital for inebriates at Foxborough and several industrial schools for boys and girls, such as the Lyman School for Boys at Westborough and the Industrial School for Girls at Lancaster.

Cities. Massachusetts has more large towns than any other state in the Union. There are 54 cities and towns with populations over 15,000 and 112 with more than 5,000 people in 1930. The first ten, in order of size, are Boston, the capital; Worcester, Springfield, Fall River, Cambridge, New Bedford, Somerville, Lynn, Lowell and Lawrence.

History. The coast of Massachusetts was probably explored by the Norseman about A. D. 1000; by the Cabots in 1497; by Bartholomew Gosnold, who attempted to make a settlement on the Elizabeth Islands in 1601, and by John Smith in 1614. But a permanent settlement was not made until 1620,

MASSACHUSETTS

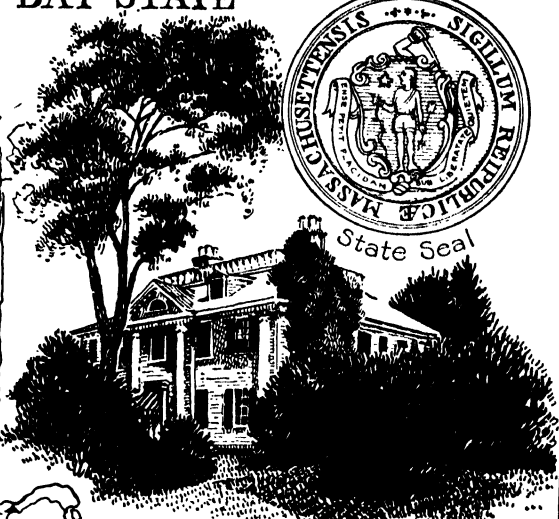
THE BAY STATE



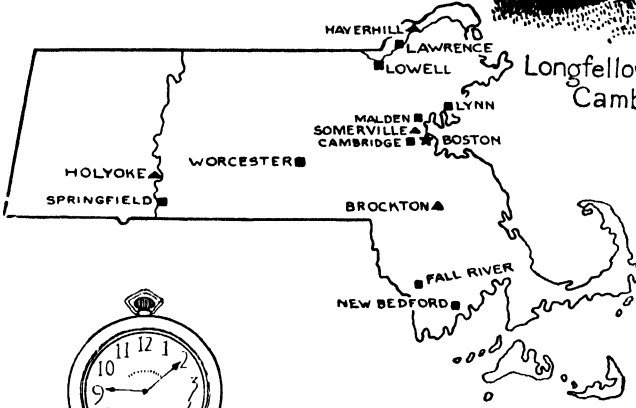
Hawthorne's "House of the Seven Gables," Salem



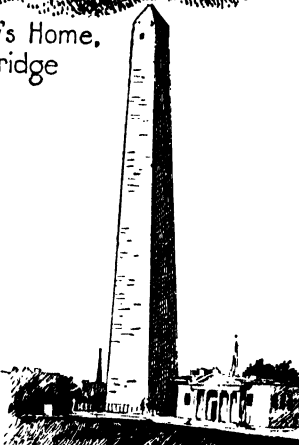
State Seal



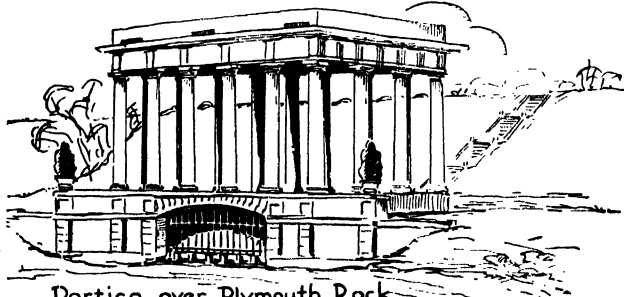
Longfellow's Home, Cambridge



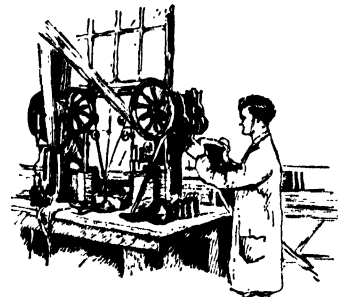
A center of the Watch Industry



Bunker Hill Monument



Portico over Plymouth Rock



Sewing Shoes in a Shoe Factory

when about one hundred English Separatists, known as Puritans in England, who had gone several years before to Holland, vainly seeking a home there, sought to found one in the New World, and landed at Plymouth. In 1630 another company of Puritans, also from England, settled at Salem, and this village, with other settlements, made soon at Boston and elsewhere, formed the Massachusetts Bay Colony.

The development of the Massachusetts Bay Colony was marked by a rigid adherence to one form of religious belief and a strong emphasis on political rights under local self-government. However, some of its leaders were among the most admirable figures in early American history. Religious intolerance led to the banishment of Roger Williams and Anne Hutchinson about 1636, the persistent persecution of the Quakers and, later, of the supposed witches. Numerous Indian wars caused great suffering during the seventeenth century. In 1692 Plymouth and Massachusetts Bay were united under a new charter, less liberal than the preceding ones.

During the eighteenth century the colony of Massachusetts experienced rapid development, which was impeded only by the troubles with the French and Indians, the strife with the king for the maintenance of its charter, and minor boundary disputes with neighboring colonies. Massachusetts led in the pre-Revolutionary struggle, furnishing not only ideas but leaders. It was the scene of some of the most important of the early events of the war. Notable among these were the battles of Lexington, Concord and Bunker Hill, the Boston Massacre and the Boston Tea Party. The first state constitution was adopted in 1780, and it abolished slavery within Massachusetts. The heavy taxes which were imposed on account of the Revolution led to a rebellion in 1786, known as Shays's Rebellion, but this was soon suppressed.

Massachusetts was among the first to ratify the Constitution (January, 1788), but during the early years of the Republic the state was strongly Anti-Federalist. After 1797, however, Federalism predominated until the downfall of the party, partly on account of the Hartford, Convention, with which Massachusetts was closely associated. The antislavery movement of later years practically started in Massachusetts, and during the Civil War the state furnished to the

Federal army about 160,000 men, and to the navy at least 30,000 men, its governor, John A. Andrew, being one of the most conspicuous of the "war governors." Since the Civil War the state has made great industrial progress and has taken an advanced position on educational and legislative matters. It has produced many famous men and women in the fields of government, literature and education. A governor of Massachusetts served as President of the United States for seven years following 1923 (see COOLIDGE, CALVIN). Consistently Republican for many years after the Civil War, Massachusetts voted for the Democratic Presidents Woodrow Wilson (1912), and Franklin D. Roosevelt (1932 and 1936).

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Boston	Gloucester	Northampton
Brockton	Haverhill	Pittsfield
Brookline	Holyoke	Plymouth
Cambridge	Lawrence	Quincy
Cape Cod	Leominster	Revere
Canal	Lowell	Salem
Chicopee	Lynn	Somerville
Connecticut	Malden	Springfield
River	Nantucket	Taunton
Fall River	New Bedford	Waltham
Fitchburg	Newburyport	Worcester

HISTORY

Boston Massacre	New England
Boston Tea Party	Confederation
Bunker Hill, Battle of	Old South Meeting
Hartford Convention	House
King Philip	Pilgrims
Lexington, Battle of	Plymouth Colony
Massachusetts Bay	Plymouth Rock
Colony	Shays's Rebellion
Massasoit	Witchcraft
Mayflower	

EDUCATION

Amherst	Harvard	Smith
College	University	College
Boston	Mann, Horace	Tufts College
University	Massachusetts	Wellesley
Clark	Institute	College
University	of Technology	Williams
	Radcliffe	College
	College	

BIOGRAPHY

Adams, John	Garrison, Wm.	Revere, Paul
Adams, John	Lloyd	Sumner,
Quincy	Hawthorne,	Charles
Bradford,	Nathaniel	Warren, Joseph
William	Hutchinson,	Webster,
Eliot, Chas. W.	Anne	Daniel
Eliot, John	Hutchinson,	Whittier, John
Emerson,	Thomas	G.
Ralph Waldo	Longfellow,	Williams,
Endicott, John	Henry W.	Roger
Everett,	Lowell, James	Winthrop,
Edward	Russell	John
	Phillips,	
	Wendell	

MASSACHUSETTS BAY, an indentation in the coast of Massachusetts, between Cape Ann on the north and Cape Cod on the south. The bay is about fifty miles long, from north to south, and about twenty-five miles wide. Cape Cod Bay is a southern extension.

MASSACHUSETTS BAY COLONY, the colony established by a body of English Puritans at the present site of Salem, Mass., in 1628. The first colony consisted of a party of sixty, under the leadership of John Endicott. This company was, from the very first, practically independent of English control, and authority was formally transferred to America in 1630. Massachusetts Bay Colony suffered from sickness, internal dissension and poor management, and later, from the most vigorous religious persecution in American history, causing the establishment of other towns and colonies, notably New Hampshire, Rhode Island and Connecticut. Massachusetts Bay Colony is honored as having established the first American college (see HARVARD UNIVERSITY) and the first American printing press.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, a scientific and industrial school of high grade, established in Boston in 1865 and moved to Cambridge in 1915. The original plan provided not only for the study of principles, but for the training of students in their practical application to various professions and occupations, and it was the first school of high grade established in the United States upon this plan. It now maintains the following courses of study, each extending over four years and leading to the degree of Bachelor of Science: electrical, civil, mechanical, chemical and sanitary engineering, mining engineering and metallurgy, architecture, chemistry, physics, biology and public health, general science, geology and geodesy, naval architecture and marine engineering and electro-chemistry. The work of each of these departments assists and strengthens that of all the others. There are also postgraduate courses in most of these departments.

The institute has a number of laboratories constructed on a very large scale, so that much of the work done in them assumes the proportion of that in actual industrial establishments. This enables the students to solve many problems in a practical way and thus to fit themselves for taking prominent positions in engineering or industrial works. The number of instructors is about 500, and the number of students is about 3,500. Students of Harvard University in engineering courses receive instruction in the Institute through coöperative arrangements under University and Institute professors.

MAS'SAGE, or *ma sahzh'*, a form of medical treatment in which the body of the patient, or some particular part of it, is stroked, rubbed, kneaded, pinched, pressed and squeezed by the hands of a skilled attendant. The effect of this treatment is to assist and stimulate the circulation and to increase the waste-removing action of the lymphatic vessels. The nutrition, not only of the parts acted upon, but of the whole body, is thus improved, swellings are reduced and inflammation decreased. The process is performed upon the naked skin by the bare hands of the operator, who needs strong, firm, soft hands and must be carefully trained. Moreover, he should have a sufficient knowledge of anatomy to be able to locate with the fingers a single muscle or group of muscles for treatment, and to trace the direction of the larger vessels and nerve-trunks and act upon them directly. The treatment has been remarkably successful in cases of nervous disorders of a hysterical kind, and in cases of wasting through imperfect nutrition dependent upon disturbances of stomach, bowels or liver. Facial massage as an aid to beauty is also in great vogue. See OSTEOPATHY.

MAS'SASOIT (1580-1661), a "good Indian" and father of a bad one, was chief of the Wampanoags. When the whites first knew this tribe, its numbers were small and the people were feeble and ready to make an alliance with the whites. The treaty was not broken for fifty years, and Massasoit was always faithful. His home was near the site of the present town of Bristol, R. I. At his death his son Philip became king. See KING PHILIP.

MASSENET, *mas nay'*, JULES EMILE FREDERIC (1842-1912), a French composer. He studied at the Paris Conservatoire and in 1878 became a professor there. He composed several operas, of which the best-known are *Herodias*, *Don César de Bazan* and *Thais*. All are included in grand-opera repertoires. They are notable for their fine instrumentation. He is also well known as a song writer.

MAS'SILLON, OHIO, a city in Stark County, sixty-five miles south of Cleveland and eight miles west of Canton, on the Tuscarawas River and the Ohio Canal and on the Baltimore & Ohio, the Pennsylvania, and the Wheeling & Lake Erie railroads and several motorbus lines. It is in a bituminous coal field and has quarries of valuable white sandstone. The industrial establishments in-

clude foundries, rolling mills, machine shops, glass works and rubber factories. The place was founded in 1825, was incorporated as a village in 1853 and as a city in 1868. Population, 1930, 26,400.

MASTER'S DEGREE, a degree conferred by universities and some colleges upon students who have completed prescribed advanced courses of study in addition to the courses prescribed for the bachelor's degree. The title awarded depends upon the course of study pursued, as Master of Arts (A. M.), Master of Science (M. S.), or Master of Laws (LL. M.).

MASTERS, EDGAR LEE (1869-), an American lawyer and writer, author of fiction, poetry, essays, biography and plays. He was born in Garnett, Kan., attended Knox College, Galesburg, Ill., and was admitted to the Illinois bar in 1891. His first important work, *The Spoon River Anthology* (1915), is a long poem in blank verse, consisting of a series of imaginary epitaphs. Other volumes of poetry include *Domesday Book*, *The New Spoon River* and *Poems of People*. Among his other works are the novels *Skeeters Kirby*, *Mitch Miller* and *Kit O'Brien*; *Vachel Lindsay* and *Lincoln, the Man*; and *Across Spoon River*, his autobiography.

MASTERSINGERS, in German, *Meistersingers*, were literary guilds which flourished in Strassburg, Nuremberg and other German cities in the fourteenth and fifteenth centuries. They had their origin in meetings of German burghers who gathered together on winter evenings to sing the songs of the minstrels. The various guilds would hold contests at which competitors sang their own compositions, and prizes of money or wreaths of flowers were awarded. After the sixteenth century the organizations gradually went out of existence, but a solitary guild lingered at Ulm until 1839.

MASTICATION, *mas ti ka'shun*, the process of dividing the food by the combined action of the jaws and teeth, the tongue, the palate and the muscles of the cheeks. By it the food, besides being finely divided, is mixed with the saliva. Imperfect mastication is a source of indigestion. See DIGESTION; FLETCHERIZING.

MAS'TIFF, a large dog of the hound group. The mastiff is a noble-looking dog, with a large head, a broad muzzle, thick lips, which hang down on each side of the mouth, hanging ears and smooth hair. The height

of the shoulders usually ranges from twenty-five to thirty inches. The usual color is some shade of buff, with dark muzzle and ears.



MASTIFF

Mastiffs are good watchdogs, and because of their docility and intelligence they are excellent pets for households having sufficient accommodations for dogs of their size. See Dog.

MAS'TODON, a prehistoric animal belonging to the elephant family, which became extinct shortly after the end of the Ice Age, about 18,000 years ago (see chart under GEOLOGY, opposite page 1477). Fossil bones and teeth have been found in all the continents except Australia, but the earliest known forms lived only in Africa and were about two feet in height. From there they spread to Europe, Asia and, finally, to North America, at a period when the last two continents were connected by land. Mastodons gradually increased in size until they attained the height of the larger elephants of to-day. These animals lived in forests and originally fed on roots and bulbs. Later they became grass-eaters and their teeth developed peculiar cross ridges, while the upper lip lengthened into a proboscis. The mastodons were covered with a shaggy coat of hair, like their relatives the mammoths (which see). They had large outward-curving tusks, and were shorter-legged and more massively built than modern elephants.

MATABELE, a Zulu race or tribe, inhabiting Matabeleland, a part of the British colony of Rhodesia, South Africa, between the Limpopo and the Zambesi, north of the Transvaal. Into this section they removed from Natal in 1827, under the leadership of their chief, Moselikatse. They are estimated to number about 240,000.

Matabeleland came under British influence in 1888. Five years later a native re-

volt was put down, as was also another in 1896. After this there was peace, the natives being given a share in the government.

MATANZAS, CUBA, a seaport and capital of the province of the same name, on Matanzas Bay, fifty miles east of Havana. It has a large, safe harbor, and the town ranks in commercial importance next to Havana. There is steamship connection direct with New York City. The town is the oil-refining center for the whole island. The chief exports are sugar, molasses, coffee and tobacco. Population, 1930, 75,000.

MATCHES, small splints of wood, one end of which is dipped into a composition which takes fire by friction or other means. One of the first forms of match was the brimstone match, which consisted of a thin strip of dry pine wood, with a pointed end dipped in sulphur. These matches were lighted with tinder ignited by a flint and steel. In 1827 the ordinary friction or lucifer match was introduced. The head of this match contained a mixture of chlorate of potash and sulphide of antimony, which had been previously dipped into melted sulphur. These matches were ignited by being drawn through a piece of folded sandpaper. Improvements on the lucifer match consist principally in producing a composition which will ignite with less friction and in covering this with some substance that protects it from the humidity of the atmosphere. For many years sulphur was a prominent ingredient of the heads of matches, but owing to its disagreeable odor it has now been discarded in favor of paraffin. Among other ingredients, white phosphorus was also formerly used for match heads, but because of its ill effects on the workmen, it has been forbidden in most countries engaged in match manufacture.

Pine or poplar wood is used in the manufacture of modern matches, the work being done by machinery. The wood is first freed from all knots and cross-grained sections, then dried and sent to the factory, where it is cut into two-inch planks. The planks are cut into pieces the length of a match, and these pieces are then cut by knives or dies into strips containing splints for matches or into individual matches, according to the plan of the plant. These splints are placed in cast iron plates which form an endless chain that moves along over a heated block, where they are warmed so that the paraffin into which the end is dipped will not harden on the

surface. From the warming block the splints pass over shallow tanks or pans containing the various substances that make the head, in the order in which they should be added. As they pass along, the ends of the matches are dipped successively into each of these pans. The heads are dried by blasts of air, and the matches are then dropped in quantities into boxes which the machine places on the table. The boxes are then covered and packed for shipping.

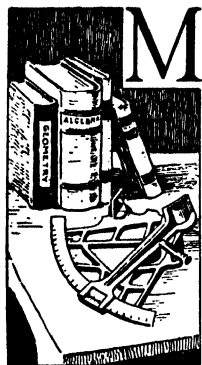
Safety matches are made by placing a part of the substance for the head on the match and the remainder on the box. The match cannot be ignited unless the head is rubbed over this prepared surface.

MATE, an officer in a vessel of the merchant marine next below the captain in rank. On a large vessel there are two or more mates, designated as first mate, second mate, and so on. Each has specified duties, and is responsible to the captain for faithful execution of them.

MATE, *mah'tay*, or **PARAGUAY TEA**, a plant of the holly family, raised in Paraguay, Brazil and some other South American countries. Its leaves are extensively used in the place of tea. The plant is in the form of a large shrub or small tree, with smooth leaves and small flowers. The tea is made by placing the dried leaves in a vessel and pouring boiling water upon them. The drink is highly prized by the people of South America, but is usually nauseating and distasteful to others. Like ordinary tea, it has a high percentage of caffeine. The term *mate* was originally the name of the vessel in which the drink was made.

MATERIALISM, in philosophy, that system which denies the existence of a spiritual or immaterial principle in man, called the mind, or soul, distinct from matter. The first theory of materialism was advanced by the early Greek philosophers, who believed that everything in the universe, even the souls of men and the gods, was made by the combination of infinite numbers of atoms, according to mathematical proportions. Since its origin, the theory has been modified many times, and modern materialism is closely associated with some theories of evolution. It denies the existence of the mind or soul as a spiritual entity and seeks to account for the activities of the mind by attributing them to the various physiological processes in the brain. Materialism is the opposite of idealism.

MATERIA MEDICA, the Latin term for *materials of medicine*, is the collective name given to the materials with which physicians attempt to cure or alleviate the numerous diseases of the human body. See **MEDICINE**.



MATHEMATICS, a general term for a number of branches of learning that deal with magnitudes, numbers and quantities and their relations. In the primary grades small pupils learning the elementary facts of arithmetic are studying mathematics, just as truly as the college student who solves intricate problems in trigonometry and calculus. Between primary and college mathematics there are many other mathematical subjects of varying grades of difficulty.

Divisions of Mathematics. The field is a broad one, but may be divided into three main departments, as follows:

(1) *Arithmetic*, that part of the science which deals with numbers, their nature, their properties and computations by means of them. It in turn includes three general divisions: first, the discussion of abstract number, that is, the abstract relations of magnitude existing between objects of the same kind; second, notation, by which those relations are expressed; third, the operations or computations by means of those symbols, to determine new or unknown relations.

(2) *Analysis*, that part of the science of mathematics in which the quantities upon which operations are to be performed are denoted by letters or other general symbols, and the operations themselves are indicated by special signs. Analysis includes four general subjects: *algebra*, which treats of the relations and properties of numbers by means of the symbols of analysis; *analytical geometry*, in which the symbols and processes of algebra are applied to geometrical quantities and processes; *calculus*, which is that part of the science of mathematics which treats of the nature, the values and the relations of a certain number of variable quantities by means of algebraic symbols and processes, and, finally, *hypergeometry* an imaginary field in which quantities of more than three dimensions are

considered, their relations being determined and expressed by algebraic symbols.

(3) *Geometry*, that branch of mathematics which treats of the relations, properties and measurements of solids, surfaces, lines and angles.

Pure and Applied Mathematics. Every branch of mathematics can be divided into two parts, pure, or abstract, and applied, or practical, or mixed. *Pure* mathematics treats only of theories and principles, without regard to their application to concrete things. *Applied*, or *mixed*, mathematics considers only those phases of mathematical theories and principles which have direct or practical application to objects or actions in the material world. The principles of applied mathematics have been of invaluable service in the investigation of such physical phenomena as heat, electricity, sound and optics; of kinematics in mechanics; of surveying and geodesy; of navigation, and of astronomy. In fact, almost every discovery in science during recent times has been first evolved through the medium of mathematical formulas.

History. The science of mathematics, as we know it, was first developed by the Greeks, although the Hindus, Babylonians, Egyptians and Phoenicians had all made some progress in the understanding and organization of the science. There is evidence that some of the most fundamental principles of algebra and the beginnings of a notation had been discovered in Egypt as early as 3000 B. C. It was nearly 2,500 years later that geometry was first formally organized, but during the next 300 years it was rapidly developed by Pythagoras, Plato, Euclid, Archimedes and Apollonius. For many centuries after the Roman conquest of Greece, mathematical progress was confined almost wholly to the Orient. During that time the Hindus, represented especially by Aryabhatta and Brahmagupta, began the investigation of the theory of numbers, made considerable progress in algebra, arithmetic, geometry and trigonometry, and first developed the present system of notation, which is often wrongly attributed to the Arabs.

The sixteenth century witnessed the first important mathematical progress in Europe, the advance beginning in Italy. Shortly afterward, there was also an awakening in France, and before the end of the century, through the labors, especially, of Descartes,

Kepler and Pascal, the science of algebra and elementary geometry had attained almost perfection, the theory of numbers had been wonderfully developed and analytical geometry had appeared. About the same time Leibnitz and Newton simultaneously expounded the theory of calculus, thus vastly extending the domain of mathematics and eventually revolutionizing all science. During modern times little addition has been made to the knowledge of the fundamental principles of mathematics, but they have been applied in a multitude of new ways and forms.

Related Articles. For additional information consult the following titles:

Algebra	Geometry	Napier, John
Archimedes	Kepler,	Newton, Sir
Arithmetic	Johann	Isaac
Calculus	Laplace,	Plato
Descartes,	Pierre	Pythagoras
René	Mensuration	Trigonometry
Euclid		

MATH'ER, COTTON (1663-1728), an American minister and writer, the eldest son of Increase Mather, was born in Boston. He was graduated at Harvard College in 1678, and in 1684 was ordained minister in Boston, as colleague of his father. The subject of witchcraft interested him greatly, and in 1689 he published his *Memorable Providences Relating to Witchcraft and Possessions*, which was used as an authority in the persecution and condemnation of nineteen victims burned for witchcraft at Salem in 1692 (see WITCHCRAFT). In 1693 appeared the *Wonders of the Invisible World*, a work intended to convince every one of the reality of witchcraft. Between that time and his death he produced many other works, among them the *Magnalia*, an ecclesiastical history of New England, and *Parentator*, a life of his father. He died with the reputation of having been the greatest scholar and author in America.

MATHER, INCREASE (1639-1723), one of the early presidents of Harvard College, was born at Dorchester, Mass. He was graduated at Harvard and was ordained a minister. In 1685 he was chosen president of the college, and four years later was sent to England as agent of the province of Massachusetts to procure redress of grievances. He held conferences with King James II and with William and Mary and returned to Boston with a new charter providing for the government of the province. For an account of his son, see above.

MATTER, that which occupies space and through which force is manifested. It is also

that which makes itself known to us by our bodily senses, though there is believed to exist one kind of matter, at least, which is too subtle to be perceived by the senses (see ETHER). Roughly speaking, matter exists in one of three states—solid, liquid or gaseous—but these are not marked off by any distinct line.

Related Articles. Consult the following titles for additional information:

Gas	Liquid	Solid	Physics
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MAT'TERHORN, or **MONT CERVIN**, one of nature's most splendid spectacles, a mighty peak in the Pennine Alps, on the boundary between the Swiss canton of Valais and Italian Piedmont. The peak, 14,782 feet above the sea, rises in the form of an immense rocky horn, the northern side of which is almost vertical. Vast glaciers are found on the slopes. Matterhorn was first ascended in 1865, by an exploring party led by Edward Whymper, a British mountain climber. Four of the party were killed in making the descent. Since then the mountain has been frequently ascended.

MATTHEW, *math'u*, SAINT, an evangelist and apostle, the son of Alphaeus. He was, previous to his call, a publican, or officer of the Roman customs, and, according to tradition, a native of Nazareth. After the ascension of Christ we find him at Jerusalem with the other apostles, but this is the last notice of him in scripture. Tradition represents him as preaching fifteen years in Jerusalem, then visiting the Ethiopians, Macedonians, Persians and Syrians, and finally suffering martyrdom in Persia.

MATTHEWS, *math'uze*, [JAMES] BRANDER (1852-1929), an American author and dramatic critic, noted for his charming personality and style, and for his brilliant and sympathetic analysis of literature and life. He has contributed a most valuable addition to American literature by his works of fiction, his literary and dramatic criticisms and his other essays. Matthews was born in New Orleans, La., and was graduated from Columbia University and Columbia Law School; instead of practicing law, however, he at once entered upon his career by writing for the magazines. In 1892 he was appointed professor of literature at Columbia, and in 1900, professor of dramatic literature. Prominent in his long list of published works are the following: *Introduction to the Study of American Literature*; *The His-*

toric Novel; *Tom Paulding*, a story for children; *Vignettes of Manhattan*, containing sketches of New York life; *In the Vestibule Limited* and *The Decision of the Court*, two comedies, to be read rather than acted; *Studies of the Stage* and *Development of the Drama*. Professor Matthews was the first president of the simplified spelling board.

MATTOON', ILL., in Coles County, seventy-five miles southeast of Springfield, on the Illinois Central and the Cleveland, Cincinnati, Chicago & Saint Louis railroads. It is in an agricultural region, where broom corn is extensively cultivated. The important industrial establishments are railroad shops, and manufactories of brooms, flour, farm implements, carriages and other articles. The principal buildings are a Carnegie Library, a hospital, a Federal building and an Odd Fellows' Home. Population, 1920, 13,552; in 1930, 14,631.

MAUMEE', a river in Indiana and Ohio, formed by the junction of the Saint Joseph and the Saint Mary's rivers at Fort Wayne, and emptying into Lake Erie. It is about 150 miles long and flows through the northwestern part of the state. The city of Toledo is situated near its mouth, and the river is navigable for twelve miles.

MAUNA KEA, *mau'nah ka'ah*, the highest peak in the Pacific Ocean, an extinct volcano on the island of Hawaii. The name means *white mountain*, for most of the year its summit is snow-covered. Its lower slopes are clothed with vegetation. Mauna Kea has the form of a huge mound, and is 12,823 feet in altitude. It is a part of Hawaiian National Park.

MAUNA LOA, *mau'nah lo'ah*, a celebrated volcano near the center of the island of Hawaii. It is the largest active volcano in the world, being 13,675 feet high and having a crater a mile and a half in diameter. In 1916 it was made a part of Hawaiian National Park. See TRAVELS IN DISTANT LANDS, subhead *Hawaii*.

MAUPASSANT, *mo pa sahN'*, HENRI RENÉ ALBERT GUY DE (1850-1893), a French author, one of the world's greatest writers of short stories. After his graduation from the College of Rouen, he served as a clerk in the Navy Department, but he gave much attention to writing, and under the instruction of Flaubert he became steadily more skilful. Among his collections of tales are *Mademoiselle Fifi*, *Tales of the Day* and

Night, *Yvette* and *Father Milon*, and his most famous single tale is *The Necklace*. He wrote also a number of novels, among which are *A Life* and *Pierre and Jean*. His work is all morbid, but it is characterized by a wonderful art and by psychological insight.

MAURITIUS, *maw rish'e us*, formerly ILE DE FRANCE, is a British island in the Indian Ocean, 550 miles east of Madagascar. It is oval in form, about 720 square miles in area and is surrounded by coral reefs. The island is composed chiefly of rugged and irregular mountains. Between the mountains and along the coast are large, fertile plains and rich valleys. The climate is pleasant during the cool season, but it is oppressively hot in summer. The principal products are sugar, rice, maize, cotton, coffee, manioc and vegetables. Control is vested in a governor and a legislative council.

Mauritius was discovered in 1505 by the Portuguese, who retained possession of it until 1598, when it passed to the Dutch. The French took it about 1710, and it was captured by the British in 1810. The capital and principal town is Port Louis, on the northwest coast, is fortified and in 1921 had a population of 50,308. Population of the island, 385,074 in 1921. Only about 4,000 are white.

MAUSOLEUM, *maw so le'um*, a name applied to any tomb of artistic design, built above ground and constructed usually of marble or granite. The name is derived from the tomb of Mausolus, an ancient king who was buried near the Aegean Sea in 353 B. C. His widow erected one of the most beautiful burial places the world, ancient or modern, has ever seen. It became one of the seven wonders of the ancient world. See SEVEN WONDERS OF THE WORLD.

MAXIM, the family name of two brothers who gained fame as inventors of war devices.

Hiram Stevens Maxim, Sir (1840-1916), was born at Sangersville, Me., but eventually became a naturalized British citizen because he believed the United States had not been fair to him. After leaving school Maxim worked as a coach builder and machinist, and later worked in New York for a ship-building company. He took out patents for improvements in steam engines, an automatic gas engine and an improved incandescent lamp, but his fame rests chiefly on the Maxim machine gun, which he perfected in Europe about 1880. The United States declined to

purchase his patent. Later he went to England, where he developed a large-power aeroplane. He also experimented in explosives and ordnance materials. He was made Chevalier of the Legion of Honor, and in 1901 was knighted.

Hudson Maxim (1853-1929), brother of Sir Hiram, was born at Orneville, Me. He devised a process for printing daily papers in colors, and was the first manufacturer of smokeless gunpowder in the United States. He developed the Maxim-Schupphaus smokeless powder used by the United States government, and invented also the explosive maxinite, and the Hudson Maxim automobile torpedo. See **TORPEDO**.

Hiram Percy Maxim (1869-1936), an American manufacturer and inventor, son of Hiram Maxim and nephew of Hudson Maxim (see both, above). As a manufacturer his factories made the articles the family invented. He originated the famous Maxim silencer for small firearms, whose sale is restricted, to keep it from the gangster element. Maxim also developed an electric automobile which he called the "Columbia phaeton." He was president of the American Radio Relay League.

MAXIMILIAN (1832-1867), an archduke of Austria and later emperor of Mexico. In 1863 he was induced by Napoleon, also by a deputation of Mexican notables, to accept the throne of Mexico. With this intention he entered Mexico in 1864. Having become involved in financial and political difficulties, Maximilian, with the approval of Napoleon, resolved to abdicate, but he was induced by the Conservative party to remain. The French army which had supported him withdrew, at the stern demand of the United States government, and after a brief period of fighting the emperor and two of his chief generals were captured and executed.

MAY, the fifth month in the modern calendar, and the third in the ancient Roman year. There is some doubt as to the origin of the name, but the theory that it is derived from *Maia*, the name of the Roman goddess of spring, seems plausible. May is truly a month in which spring reigns triumphant. Flowers, leaves and grass are in their freshest and richest garb, and drab winter is forgotten. Some say, however, that *May* comes from *Majores*, the Latin for *older men*. They remind us that among the Romans the month of May was sacred to the older men,

while June was sacred to the younger men, or *Juniores*. May has always had thirty-one days. Its gem is the emerald, and its flower the hawthorn.

Special Days for Celebration. The first of May, or *May Day*, has been associated with out-of-door festivities from the days of ancient Rome. The Romans were accustomed to hold yearly processions in honor of Flora, goddess of flowers, between April 28 and May 3, and it is supposed that the beautiful village festivals of medieval England had their origin in this custom. The English maypole, set up on the village green the night before May Day, was bedecked in the morning with flowers, which were brought from the woods by happy young people. Especially joyous was the beauty who was chosen queen of the May.

Dancing about the maypole is introduced into school programs.

A distinctively-American celebration occurs on the thirtieth of May, when the graves of dead Union soldiers are decorated and special patriotic services are held (see **MEMORIAL DAY**). May thirtieth is observed universally throughout the Northern states, but Confederate soldiers are honored on various other dates between April and June. In Canada *Empire Day* (which see) is celebrated on the anniversary of Queen Victoria's birth, the twenty-fourth of May.

Anniversaries for Celebration. The following birthdays of notable persons occur in May:

Joseph Addison, May 1, 1672.
George Inness, May 1, 1825.
Jacob A. Riis, May 3, 1849.
Horace Mann, May 4, 1796.
Hubert Howe Bancroft, May 4, 1832.
Robert E. Peary, May 6, 1856.
Robert Browning, May 6, 1812.
John Brown, May 9, 1800.
James G. Bennett, Jr., May 10, 1841.
Gabriel D. Fahrenheit, May 14, 1686.
Florence Nightingale, May 15, 1820.
Honoré de Balzac, May 16, 1799.
Edward Jenner, May 17, 1749.
Alfonso XIII, May 17, 1886.
John Stuart Mill, May 20, 1806.
Albrecht Dürer, May 21, 1471.
Wilhelm Richard Wagner, May 22, 1813.
Thomas Hood, May 23, 1799.
Queen Victoria, May 24, 1819.
Ralph Waldo Emerson, May 25, 1803.
Edward Bulwer-Lytton, May 25, 1803.
Dante, May 27, 1265.
Julia Ward Howe, May 27, 1819.
Patrick Henry, May 29, 1736.
Walt Whitman, May 31, 1819.

The following important events occurred in May:

Battle of Manila Bay, May 1, 1898.
Sinking of the *Lusitania*, May 7, 1915.
Capture of Ticonderoga by Ethan Allen, May 10, 1775.
Death of "Stonewall" Jackson, May 10, 1863.
Nomination of Lincoln, May 18, 1860.
Italy declared war on Austria, May 23, 1915.
Constitutional Convention began its work, May 25, 1787.
Death of Joan of Arc, May 30, 1431.

MAYA, *mah' yah*, a race of Indians in Northern Mexico, Yucatan in particular, who comprised a flourishing nation centuries before the conquest of Mexico by Cortez (1520). When and how they reached that country is unknown, but it is surmised that ancient wanderers from Asia reached Kodiak Island (Alaska), because of evidences found there, and that their descendants went south and laid the foundations of Maya culture. Excavations have disclosed a considerable civilization as early as A. D. 575, for at that time they possessed a calendar; a key to this has been found, and it helps to disclose Maya mysteries.

The Mayas were the only prehistoric people in North America who left inscriptions by which in part their history could be deciphered. We are as ignorant of their fate as a nation as we are of their origin, but it is now known that they lived in a region of many lakes long since gone, and that the washing away of the soil in the process of silting destroyed its fertility, and may have been a prime cause of the destruction of their civilization.

They built large cities, evidences of more than forty of which have been uncovered in the denseness of the present wild and almost inaccessible Yucatan jungle. Some of these show massive designs of beauty; their interiors were artistically wrought. The Mayas worshipped idols, offered sacrifices on stone altars, practiced rude arts of war, had skill in ornamental designs. They were agriculturists, and their descendants are now among the peons of Mexico. See **ARCHAEOLOGY**.

MAY APPLE, a common plant of North America, sometimes called the *mandrake*. It belongs to the barberry family. Two large leaves are borne on a stem a foot or more high. From the fork between them grows a large, handsome flower, with waxy petals, which produces a yellowish, slightly acid, pulpy fruit, about the size of a pigeon's egg. From the root a powerful drug is prepared.

MAY BEETLE. See **JUNE BUG**.

MAY FLOWER, the small sailing vessel which the Pilgrims chartered in 1620 to convey them to America. It was a boat of only 180 tons. Two vessels, the *Mayflower* and the *Speedwell*, started from Delfthaven on the historic journey, but the latter, unseaworthy, turned back after several days. The *Mayflower*, after sixty-three days sailing, reached America December 11, 1620 (new style calendar, December 21), with its 102 Pilgrims.

Related Articles. Consult the following titles for additional information:

Massachusetts	Plymouth, Mass.
Pilgrims	Plymouth Rock

MAY FLY, DAY FLY, or SHAD FLY, names applied to a small insect of very interesting habits. The name *day fly* refers to the brevity of the adult stage, but it is not true that the insect lives only a day. It may live a week or more, when fully developed, and in the immature stage it exists for one, two or three years, according to the species. The eggs fall from the body of the mother may fly to the surface of a stream, lake or pond and sink to the bottom. From each egg is hatched a tiny six-legged creature called the nymph, which is soft of body and wingless. It remains under water during the whole of its existence as a nymph. When ready for the change it rises to the surface, splits open its skin and flies away on delicate wings that have all the time been forming.

Nearly all may flies undergo a second molting after acquiring wings, the period between molts being called the *subimago* stage. This may last from a few minutes to twenty-four hours, and is experienced by no other group of insects. The adult insect is very fragile, and the mouth parts are either lacking or so immature as to be useless. So far as known the adult may flies take no food.

MAYHEM, an old form of *maim*, with practically the same meaning. As a legal term it refers to the wilful maiming of an adversary, as when one in a fight may inflict a wound by biting a hand or an ear of his opponent. Any deliberate injury which would make a person less able to defend himself is mayhem. If one man conspires with another to cut off a finger to escape military service, both are guilty of mayhem.

MAYO, CHARLES HORACE (1865-), and WILLIAM JAMES (1861-), two brothers who rank among the foremost surgeons of America. The elder was born at Le Sueur, Minn., the younger at Rochester, and both were edu-

cated in the schools of the latter city. William took his medical training at the University of Michigan, and Charles received his at the Chicago Medical College. In 1889 the brothers became part of the staff of the new Saint Mary's Hospital, at Rochester, and they made that institution one of the most famous in the world. Eminent surgeons have journeyed from all parts of Europe to observe their wonderful skill in operations of all kinds, as many as fifty visitors often being present on one day. A remarkably large proportion of their operations have been completely successful, even of those which had never before been attempted. In 1915 the brothers presented the University of Minnesota with an endowment of \$2,000,000 and their surgical laboratory (see MINNESOTA, UNIVERSITY OF).

MAYOR, the chief executive of a city in all English-speaking countries. He is usually elected by majority vote, and serves from one to four years, with possibility of reëlection. His duties include the enforcement of the ordinances of the city and recommendation to the board of aldermen or commission of measures for the betterment of the community. Some mayors serve without pay; in large cities the duties and responsibilities of the mayor are so great that men of high character and executive ability should be sought for the office, and they are frequently paid large salaries, commensurable with the weight of their responsibility to the people.

In some countries of continental Europe, particularly Belgium, Holland and Germany, for many years the mayors, or burgomasters, have been advanced to their posts through years of education for the particular duties of the office.

Related Articles. Consult the following titles for additional information:
City Manager **Commission Form of Government**

MAZARIN, *maz a ran'*, **JULES** (1602-1661), a French statesman and cardinal, an Italian by birth. He entered the Pope's military service and distinguished himself by diplomatic ability, for which he was rewarded with two canonries and the appointment of nuncio to the court of France. Here he gained the favor of Richelieu and accepted service from the king. He became a naturalized citizen of France and was made a cardinal, and in 1642, when Richelieu died, Mazarin succeeded him as Prime Minister.

On the death of Louis XIII, he won over the queen regent and made himself master of the nation during the minority of Louis XIV. He antagonized the members of the Parliament of Paris by ignoring their political rights; he infuriated the nobles by his concentration of power in the court; and all groups resented the heavy and increasing taxes he imposed. In the class war that broke out in 1648, the Paris rabble, hurling stones with slings, became known as the *Frondeurs* ("Slingers") and the struggle was called the civil war of the *Fronde* (which see). Mazarin at first made concessions, then revoked them, and was forced to leave the country. In 1653 he returned and regained supreme power in the state, thus laying the foundation for the absolute monarchy of Louis XIV.

MAZEPPA, **IVAN STEFANOVITCH** (1640-1709), a famous leader of the Cossacks. He was of a noble Russian family, and entered the service of John Casimir, king of Poland. Discovered in an intrigue with the wife of a Polish noble, he was fastened upon the back of his own horse, which was then driven out into the steppes. The horse carried him back to his home, but he was ashamed to remain there and joined the Cossacks in the Ukraine. Through his ability he became their leader, and he was made prince of the Ukraine by Peter the Great. Later, however, Mazeppa, believing that it might be possible to gain complete independence for the Cossacks, joined Charles XII of Sweden, and after the Battle of Pultowa he was obliged to flee. His history has furnished a subject for paintings, novels, poems and dramas. The most famous of the poems is Byron's *Mazeppa*.

MAZZINI, *mat se'ne*, **GIUSEPPE** (1808-1872), an Italian patriot, born at Genoa. He early began writing literary and political essays for periodicals, and as his writings grew more distinctly liberal in tone, the government suppressed several of the papers in which they appeared. Mazzini afterward joined the Carbonari, and as a result of his share in their disturbances he was imprisoned in Savona for some months. On his release he was exiled to Marseilles, but was compelled by the French government to retire into Switzerland. During the following five years he planned and organized various unsuccessful revolutionary movements, until, in 1837, he was expelled by the Swiss authorities and

sought refuge in London. During the revolutionary movements of 1848 he proceeded to Italy, served for a time under Garibaldi, and when the Pope fled from Rome became a triumvir in its short-lived republic. Afterwards he continued to organize various risings in Italy, and the successful expeditions of Garibaldi were due in part to his labors. His republican principles prevented him from accepting a seat in the Italian parliament, to which he was several times elected. The society of Young Italy was organized by Mazzini (see *YOUNG ITALY*).

MEADE, *meed*, GEORGE GORDON (1815-1872), an American soldier, born of American parents at Cadiz, Spain. He was graduated at West Point in 1835. After serving in the Seminole War, he became a civil engineer and was employed in government surveys. He reëntered the engineering branch of the army in 1842 and served in the Mexican War under General Taylor. He was commissioned brigadier-general of volunteers in August, 1861, a few months after the outbreak of the Civil War, and as commander of one of the three Pennsylvania brigades he was active in the work of strengthening the defenses of Washington. Meade was transferred to McDowell's army in 1862, and shortly afterward was ordered to the Peninsula to serve under General McClellan, commander in chief of the Federal armies. He fought at Mechanicsville, Gaines's Mill and Frazier's Farm, and though incapacitated for a time by a severe wound, was present at the second Battle of Bull Run. Later, for gallantry at Antietam, he was commissioned major-general of volunteers. Meade was continuously in active service throughout the remainder of the war.

He performed notable service at Fredericksburg and Chancellorsville, in covering the retreat of the Federal army, and in June, 1863, succeeded Hooker in command of the Army of the Potomac, just at the crucial point in Lee's second invasion of Pennsylvania. Meade was in command at the Battle of Gettysburg. Though winning a notable victory, he failed to pursue the Confederates promptly and thus incurred the censure of some military critics. Meade commanded the Army of the Potomac in Grant's Virginia campaign of 1864-1865, as a major-general in the regular army. After the war he commanded one of the military districts of the South during reconstruction days.

MEADOW LARK, an American bird, called a lark because of its pleasing song, but it is not a lark. It belongs to the orioles. It is a medium-size bird, with a bronze mottled plumage above and a bright yellow belly, with a rich, black, crescent-shaped collar across its breast. Its home is in the damp meadows, where it builds an oven-like nest in a hole in the ground. There are four to six eggs. It is one of the earliest of spring birds in the north.

MEADVILLE, *meed'vil*, PA., the county seat of Crawford County, 105 miles north of Pittsburgh, on the French Creek and on the Erie, the Northwestern Pennsylvania and the Bessemer & Lake Erie railroads. The city is in a fertile region and contains railroad shops, iron works, planing mills, silk mills, chemical works and manufactories of automatic tanks, cans, corsets and vises. Allegheny College and Meadville Theological School are located here. There are four music schools, two hospitals and a library. It was settled in 1788 and was made a city in 1866. Population, 1920, 14,568; in 1930, 16,698, a gain of 14.5 per cent.

MEALY BUG, a scale insect so called because of the white powder which covers its body. It is a tropical or sub-tropical insect, though it is occasionally found in some parts of the Southern United States, where it often does great injury to oranges. Other species are also enemies to greenhouse plants throughout the temperate regions. They are often accompanied by ants, which help to scatter them in greenhouses by carrying the young bugs to new feeding grounds. They may be exterminated by the use of a kerosene-soap emulsion, well diluted.

MEASLES, *mé'zls*, a contagious disease prevalent in childhood, characterized by a skin rash. It is occasionally contracted by adults, but is most common between the ages of one and five. Most people are immune to second attacks, but there are exceptions to the general rule. From one to two weeks elapse between the time of exposure and the appearance of the first symptoms. These include headache, rise of temperature toward evening, lassitude and discharges from the eyes and nose. On the fourth day small red pimples break out on the face and neck, the rash spreading later to the other parts of the body. Measles pimples have the color of a raspberry and occur in patches; those of scarlet fever are spread uniformly over the skin and

are the color of a boiled lobster. Measles is less dangerous than scarlet fever, but is more easily contracted. It is spread by secretions from the mouth or nose, and one may acquire it by touching objects previously handled by an infected person.

Though measles is not dreaded to the degree that many other diseases are, it frequently leaves behind it impaired vision or hearing, and an attack calls for careful nursing. Neglect may lead to bronchial trouble or pneumonia. A physician should be called, and the patient should be kept under his supervision. Treatment consists in protecting the eyes, keeping the patient warm and comfortable, and keeping the bowels active. A light diet is desirable. If the rash does not come out well the physician will prescribe hot drinks or other remedies. Complete isolation of the patient until a cure is effected is very important.

German Measles. This name is applied to a disease resembling ordinary measles, but of a milder nature. The rash is rose-colored and is sometimes limited to the face, neck and shoulders. An attack calls for about the same sort of nursing as is given in ordinary measles. Isolation of the patient is important, as the disease is highly contagious.

MEASUREMENTS. See MENSURATION; METRIC SYSTEM; WEIGHTS AND MEASURES; CYLINDER; CIRCLE.

MEASURING WORM, a name given to the small caterpillars of certain moths. They are long and rather slender, and their feet are grouped at the extreme ends of their bodies. Fastening their fore feet, they bring the hind feet close up to them, thus looping the body above; then raising the head and fore part of the body, they thrust it forward to its full length. From this habit they take the name given above, as well as the names *loopers* and *inch worms*. Some have the habit of thrusting their bodies out from a branch and remaining immovable in almost perfect imitation of a broken twig. Some measuring worms are extremely destructive pests. See PROTECTIVE COLORATION and MIMICRY.

MEAT, a term applied to the flesh of poultry, cows, hogs, sheep and other animals used as food. Ordinarily a distinction is made between the flesh of these animals and that of fish, the latter being designated simply as *fish*. Meat consists of muscular and connective tissues, bone and fat. Muscular tissue is made up of bundles of hollow tubes, or fibers,

joined together by connective tissue. The fibers in tender cuts are shorter than those found in tougher parts, such as portions of the animal which exercise a good deal. The flesh of young animals is also more tender than that of old ones.

Composition and Digestibility. Besides water, the chief constituents of meat are protein and fat. Nearly all the protein and ninety-five per cent of the fat in animal food are digested under normal conditions, and there is no difference in the completeness of the process in tough and tender cuts. There is, however, a difference in time required for digestion. Pork, which has a high percentage of fat, is digested more slowly than beef or mutton; veal is also somewhat long in digesting. Chicken breasts are among the most easily-digested meats. Generally speaking, the meats with comparatively little fat and with short fibers are most quickly assimilated. While more of the content of meat is digested than of vegetables, the fact that meat is more concentrated and has less waste should be considered by those with a tendency to constipation. Such persons will do well to eat sparingly of meat. It should also be remembered that undigested protein causes the formation of hordes of putrefactive bacteria in the intestines, resulting in a release of poisons in the system. Overeating of meat, which means eating more than the system can assimilate, is believed to be a cause of cancer, tuberculosis and many other diseases. Rheumatic persons should also be light meat eaters, as meat may produce uric acid in the system.

Fuel Value. The fuel value of meat, as of all other foods, is measured by the calorie, or amount of heat necessary to raise the temperature of one pound of water four degrees F. Fats are the best heat-making foods, having a fuel value of 4,040 calories per pound. Proteins have a value of 1,820 calories per pound. Meats are therefore good fuel foods. The average values of mutton, pork and beef are respectively as follows: 1,695, 1,580 and 1,040. Beans or eggs are good substitutes for meat, as both have a high percentage of protein. For detailed directions as to buying and cooking meat, see the article DOMESTIC SCIENCE, subhead *Meat*.

Related Articles. Consult the following titles for additional information:

Bacon	Fat	Mutton
Beef	Food	Pork
Calorie	Meat Packing	Proteins



MEAT PACKING. Soon after 1850 young Gustavus Swift borrowed \$20 from his father to buy a cow. He had an idea if he could buy, slaughter and sell it to the neighbors, he could make some money—and he did. This was the beginning of one of America's greatest packing companies, and the industry of meat packing, whose possibilities

were thus perceived, has developed into one of the world's most stupendous commercial enterprises and is the largest industry in the United States.

The United States is the world's center of the meat-packing business. If Adam had lived until now and could have started in the year 1 of the Jewish calendar to count silver dollars at the rate of one a minute, he would still lack many hundred million dollars of having handled enough money to buy the 90,000,000 cattle, hogs and sheep in the United States, even though he worked eight hours every day. As practically all of these animals now being fed on the farms will sooner or later be converted into meat for the table, it is possible from this illustration to get some conception of the vastness of the packing industry and of the great aggregations of capital required to carry it on.

There are nearly 1,650 packing establishments, great and small, in the United States which are conducted under Federal supervision. In the development of the great industry there has been a tendency to concentrate packing plants at various centers, selected by reason of their geographical location or their commercial advantages. As sixty-four per cent of the population of the country lives east of Chicago and seventy per cent of the live stock is raised west of that city, Chicago is the logical center of the packing industry, particularly so when its superior shipping facilities are considered.

Other important centers are Kansas City and Saint Joseph, Missouri, South Omaha, Neb., and Fort Worth, Texas. Live stock trains are driven at express speed to these slaughtering and packing centers, and are often given the right of way over passenger trains. Every hour that an animal is entrained means loss of weight and conse-

quently loss in profit to the owner on the farm. When each trainload reaches its destination the stock is placed in cattle yards and is then inspected and purchased by buyers in the employ of the great packing companies. In this there is often keen competition.

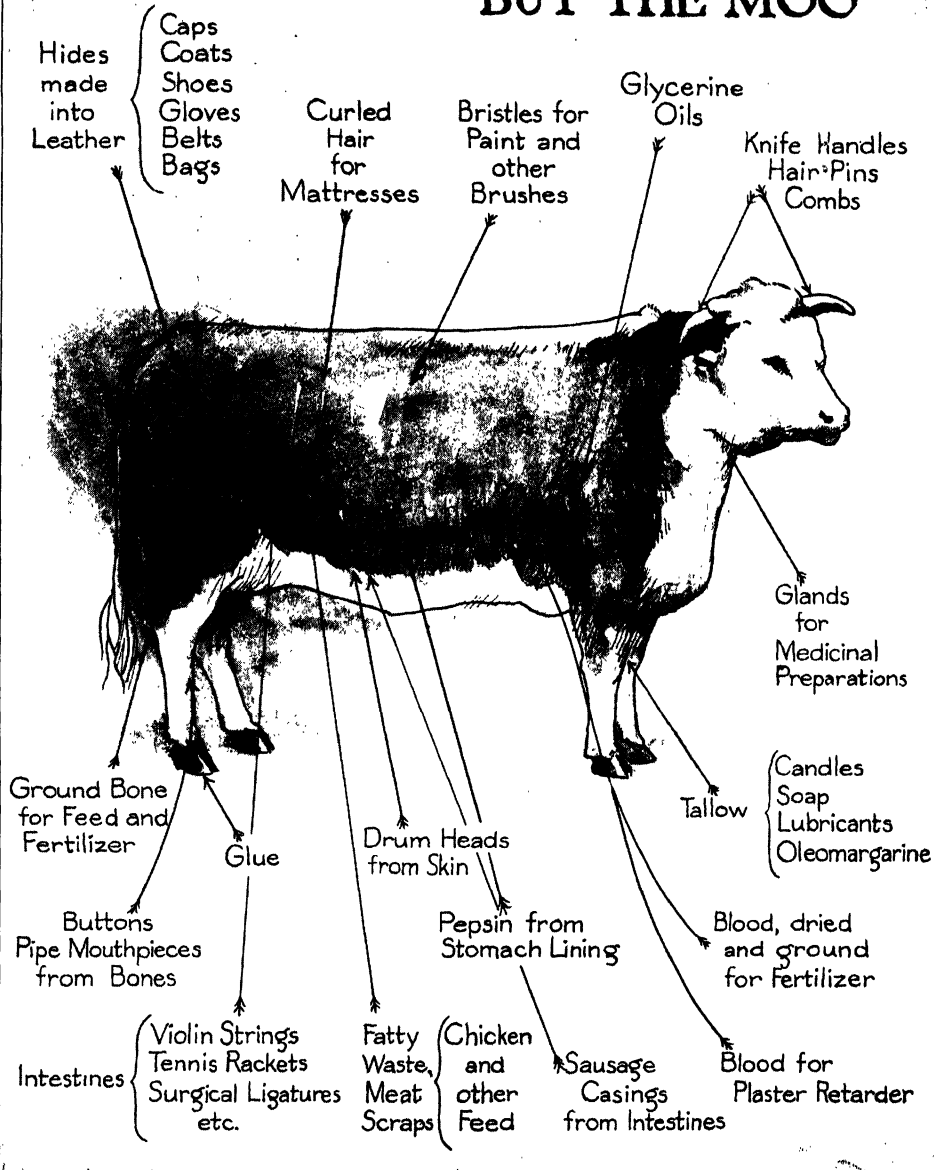
Few people realize the immensity of the slaughtering and meat-packing business. One of the large companies has eight great plants between Chicago and Denver. Its annual capacity is nearly 12,000,000 cattle, including calves, 70,000,000 hogs and 20,000,000 sheep, representing a slaughtering of 100,000 animals every working day—more than 100 every working minute and nearly three every working second. And this is the record in only the large plants.

After animals are purchased in the public pen they are driven to the private pens of the purchasing companies. They are allowed to rest twenty-four hours before being slaughtered, then they are given a shower bath and are ready for killing. The animals are killed after passing up inclined viaducts to the top of the building. As they pass from one process to another, their bodies are worked downward, until, when completely dressed, they are sent to the cooling rooms on the ground floor. The work is done with remarkable rapidity. It requires less than six minutes to dress a hog and less than thirty minutes to dress a steer. The division of labor is carried so far that each workman does only one thing and consequently becomes very skilful in his work.

By the use of ice, ammonia or brine the cooling rooms are kept at a temperature a little above freezing. Here the meat remains until the animal heat is entirely removed. Pork requires about three days for cooling, and after that time it is ready for the finishing processes. Beef, however, remains in the cooler at least eight or ten days before it is ready for the market, if it is to be sold as fresh meat, and some of the choicest cuts are kept for two or three weeks. This is to allow the meat not only to cool but to become tender, as well. The process is known as "ripening." Beef that is to be shipped in refrigerator cars is usually loaded after three days, because it can be kept as cool in the car as in the packing house.

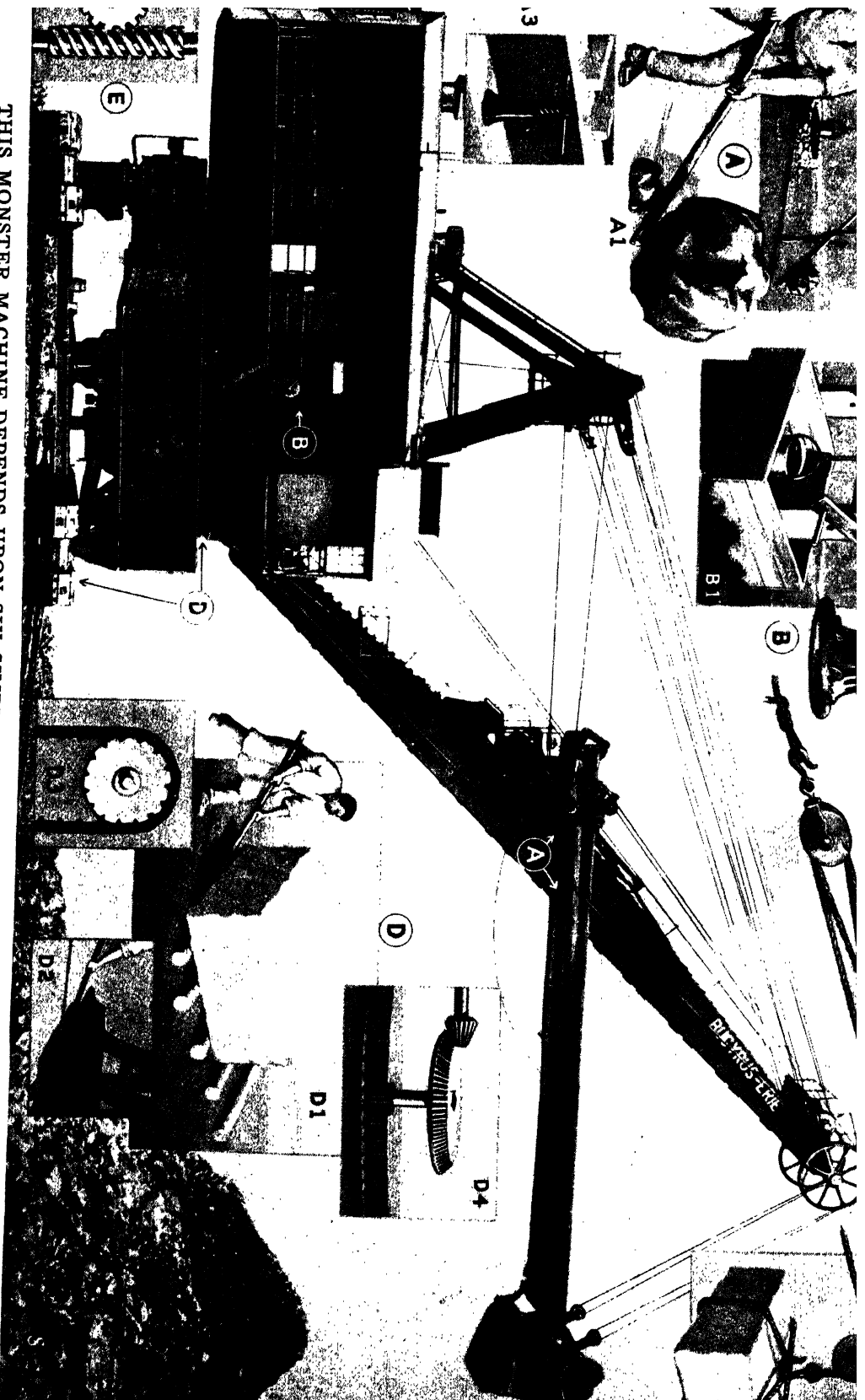
Products. The different preparations of beef, pork and mutton are too numerous to mention. They may be classed as fresh meats,

NO WASTE - SAVING EVERYTHING BUT THE MOO



BEEFSTEAK AND ITS HOST OF COUSINS

Many of these cousins are humble enough. Perhaps lordly beef would not care to own them. From a 1,000-lb. steer 550 lbs. of meat and 450 lbs. of by-products are obtained. If it were not for the income derived from these by-products the price of beef would be much higher than it is. Bossy, whether Stevenson's "friendly cow," or uneasy western steer, capitalizes all its resources—and for our benefit.



THIS MONSTER MACHINE DEPENDS UPON SIX SIMPLE MECHANICAL PRINCIPLES

The mechanical powers of the lever, A1, A2; screw, A3; wheel and axle, B1 and B2, and pulley, C1 and C2; all contribute in raising and lowering the bucket. The lever and wheel (roller) are combined in D1 and D2. Modern application, D4. Chain drive, D3, as applied to caterpillar tractor. Worm drive E. *Wardner and Twiss*—1

salt meats, smoked meats, lard, tallow and special preparations, such as canned meats, dried beef and sausage. Each class includes a great variety, but the pork products are far more numerous than the others. After the head is taken off the hog, the sides are cut into ham, side, shoulder, loin and spare rib, if the meat is to be used in this country. If designed for export, it is cut to suit the custom of the country to which it is sent. With us, the loin and spare rib are sold as fresh meat, the hams and shoulder are pickled and smoked, the sides and backs are dry salted or pickled for salt pork and bacon, and the head and trimmings are made into sausage.

Shipping. Large quantities of beef, pork and prepared meats are shipped to distant cities and to foreign countries. Prepared meats are shipped in casks, cases and cans, but all fresh meat is transported in refrigerator cars or refrigerator ships. So perfect are these refrigerators that beef shipped from Chicago to Liverpool or any other European port arrives at its destination in a perfect state.

Government Inspection. Before slaughtering, all animals are examined by government inspectors, and any that are diseased or injured are rejected. After slaughtering, all meat is inspected, since some diseases which may escape detection in the live animal are detected in the meat. This rigid inspection is an assurance that all meat that is allowed to be placed on the market is perfectly wholesome.

By-Products. In no industry is there less waste than in meat packing. Everything about the animal is used. The hides are made into leather; glue, soap and oils are made from the hoofs and other parts that are not suitable for meat; the intestines are made into "skins" for packing sausages; the blood and offal are converted into fertilizer; combs, knife handles and buttons are made from the horns and hoofs, the hair of cattle, the wool of sheep and the bristles of hogs are of value in the manufacture of numerous articles. The value of hogs' bristles exported each year is over two million dollars, and this is one of the smallest items among the by-products.

Who Eats the Meat. Australians are the heaviest meat eaters; they consume an average of 240 pounds per year for each person. Argentina, which is becoming a great meat-producing country, consumes 105

pounds per person, just equalling the per capita consumption in the United States. Canada is next, with ninety-five pounds for each person, and Great Britain's consumption is almost as much. Switzerland, Denmark, France, Norway. Germany and Sweden follow with from sixty to seventy pounds per capita; each person in Belgium and Spain demands fifty pounds; Russia consumed over forty pounds per person before the World War, and Portugal and Holland demand thirty-five pounds per person. Italians eat less meat than any other people on the European continent, twenty-five pounds per person satisfying them.

Related Articles. Consult the following titles for additional information:

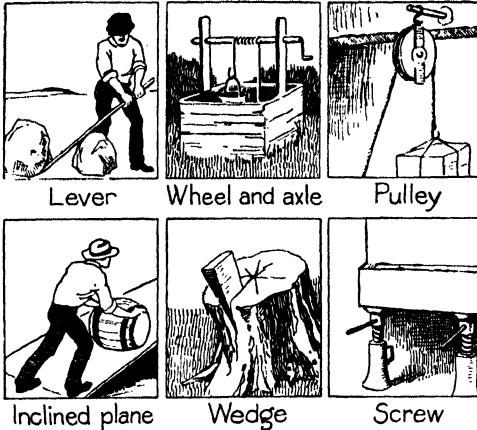
Bacon	Meat
Beef	Mutton
Beef, Extract of	Pork
Cold Storage	Sausage
Lard	Tallow

MEC'CA, or MEK'KA, ARABIA, the birthplace of Mohammed and the holiest city of the Mohammedan world. Mecca is the capital of Hedjaz, formerly a province of Arabia, but in 1916 proclaimed an independent kingdom (see ARABIA, subhead *Hedjaz*). It lies in a narrow, sandy valley, about sixty miles east of Jiddah, its port on the Red Sea. The most notable edifice in the city is the great mosque, within which is the Kaaba, a cube-shaped stone building that devout Mohammedans regard as their holy of holies. The city, at the time of the Hajj, or annual pilgrimage to the Kaaba, enjoined by Mohammed on all his followers, is filled with pilgrims, who increase the population by about 100,000. This pilgrimage is the only source of wealth and occupation to the inhabitants of Mecca. Population, about 130,000.

MECHANICAL, *me kan'ik al*, POWERS, the simple machines or some parts of them on which every machine, however complicated, must be constructed. These simple machines are the lever, the wheel and axle, the pulley, the inclined plane, the wedge and the screw. Each is described under its title in these volumes. See next page.

MECHANICS, *me kan'iks*, the term originally used to denote the general principles involved in the construction of machinery. Later the term became separated from all direct connection with practical applications, and it now deals entirely with abstract questions in which the laws of force and motion are involved. In this sense, mechanics is usually divided into *dynamics*, which treats of

moving bodies and the forces which produce their motion, and *statics*, which treats of



THE SIX MECHANICAL POWERS

forces compelling bodies to remain at rest. See **DYNAMICS**; **STATICS**.

MECHANICSVILLE, BATTLE OF, a battle fought at Mechanicsville, seven miles from Richmond, Va., June 26, 1862, between a Federal force of about 5,000, commanded by General Fitz John Porter, and a Confederate force of 10,000, under the personal direction of General Robert E. Lee. The Federals were in a strong position and compelled the Confederates to open the engagement. Two attacks were repulsed, but on the morning of June 27, upon the arrival of General Stonewall Jackson with Confederate reinforcements, General Porter retreated to a stronger position at Gaines's Mill. The loss of the Confederates was about 2,000, and that of the Federals, about 360. The battle opened the so-called "Seven Days' Battles" of the Peninsula Campaign.

MECHLIN, *mek'lin*. See **MALINES**.

MECK'LENBURG DECLARATION OF INDEPENDENCE, a set of resolutions concerning which there has been much controversy. It was formerly believed that a series of resolutions declaring for independence from British rule were adopted on May 20, 1775, at Charlotte, Mecklenburg County, N. C., and that they contained phrases similar to those used in the Declaration drawn up by Jefferson. The original minutes of the meeting were said to have been destroyed by fire. After much investigation historians came to the conclusion that a series of resolutions were adopted, but that they were quite different in phraseology from the Jefferson doc-

ument. The meeting is believed to have been held on May 31.

MECKLENBURG-SCHWERIN, *mek'len-boorK shva reen'*, before November, 1918, a grand duchy of the German Empire in the low country bordering on the western end of the Baltic Sea. Under the republic until 1933 it was one of the states of the Reich; in the latter year Mecklenburg-Schwerin and Mecklenburg-Strelitz were joined in the one state of Mecklenburg. Area, 6,197 square miles; population, 805,200; principal city, Rostock (pop. 93,530).

MEDE'A, in Greek mythology, daughter of Aetes, king of Colchis, on the eastern coast of the Black Sea. After helping Jason to obtain the Golden Fleece, she fled with him. To retard her father in his pursuit, so the story goes, she killed her young brother, Absyrtus, whom she had carried away with her, and scattered his limbs on the sea. On arriving with Jason in Thessaly, Medea, through her sorceries, put to death Pelias, Jason's uncle, who had kept him from his kingdom, and together they reigned for years. When Jason, however, deserted Medea for Glauce, the sorceress sent to her rival a poisoned robe, which caused her death, and afterward Medea put to death her own children. She then, in her dragon car, mounted into the air and disappeared. This story is the basis of a famous tragedy by Euripides.

MEDFORD, ORE., in the southwestern part of the state, in Jackson County, in the valley of the Rogue River, 205 miles south of Eugene and fifteen miles from California. It is on the Southern Pacific railroad. Medford is the center of a fruit region, and is a market for apples and pears. In the surrounding region there are extensive pine forests; scenic features of interest in the vicinity include Klamath and Crater lakes. The city possesses a Carnegie Library, a \$120,000 Federal building, and Elks' Club and Sacred Heart Hospital. There is an airport. Population, 1920, 5,756; in 1930, 11,007, a gain of 91.2 per cent.

MEDICAL SCHOOLS, institutions for training men and women for the professions of medicine and surgery. At one time there were more than 160 of these schools in the United States; this large number was accounted for because there were no rigid qualifications for entrance or for graduation. Gradually, in response to demands that qualifications be raised, the number of

schools has been reduced to fewer than ninety. Only about five now require qualifications for entrance as low as a high-school education provides; all the remainder admit as students only those who possess two or four years of college credits. Courses of study in all medical schools have been greatly strengthened, and a few schools require a year's experience as hospital interne after graduation before the degree of doctor of medicine (M.D.) is granted. Many of the state universities have strong medical departments; in a few states no other medical schools exist.

Women are admitted nearly everywhere on equal terms with men; there are a few schools for women only.

MEDICI, *ma'de che*, a Florentine family which rose to wealth and influence by successful commercial ventures and which continued to combine the career of merchants and bankers with the exercise of political power and a liberal patronage of literature and art. The most famous of the family was Lorenzo de'Medici, called the Magnificent (1449-1492). By his munificence he made himself popular with all classes in Florence and attained the position of an absolute ruler. He encouraged learning and the arts in the most liberal manner; he founded academies and had collections made of books and art relics. The popes Leo X, Leo XI and Clement VII, Catherine, the wife of Henry II of France, and Marie, wife of Henry IV of France, were of the Medici family.



MEDICINE, *med'i sin*, a general term for the science of preventing and curing bodily ills. It is broadly divided into two great divisions, *medicine* proper and *surgery*, but these divisions are very closely related and in many cases overlap. In a primitive stage of civilization diseases were believed to be caused by supernatural beings who must be placated by ceremonies and prayers. Such beliefs gave rise to the witch doctors and medicine men of savage tribes. In course of time it was recognized that diseases arose from natural causes, but each disease was held to be a principle distinct from its effects, and each disease was sup-

posed to have a special remedy—something that would actually cure the disease.

Such views led to the adoption of various systems of treatment. For instance, one school held that only vegetable remedies should be used in the treatment of diseases; another school upheld the virtues of the bath as a universal panacea for all human ills. A third maintained that diseases are cured by substances having, in small doses, an action on the body similar to that of the disease, so that one might treat diseases by a series of fixed and specific formulae, all depending on this single principle. Finally, there is a school that upholds the theory that diseases are cured by contraries, that is, by remedies having an action on the body the reverse of that of the disease.

Modern medical practice, however, has been revolutionized by the general acceptance of the germ theory of disease—that the majority of diseases are the result of certain micro-organisms which gain entrance into the body through the air, food and drink. The experiments of the French chemist Pasteur, carried on in the latter part of the nineteenth century, proved the truth of this theory, and modern methods for the prevention and cure of infectious diseases are therefore based upon it. Outside of quinine, a cure for malaria, there are scarcely any known drugs that are specific remedies for specific diseases. The general tendency is to produce a serum which will counteract the disease in question, the serum in each case containing germs of that disease. To prepare curative or preventive serums it is necessary to isolate the special organism that causes the disease. Physicians have discovered the germs causing typhoid, diphtheria, cerebrospinal meningitis and a few other dangerous diseases, and these are now treated by means of serums, but their search for influenza, scarlet fever and measles germs has not as yet proved successful.

The fight against infectious diseases has been vastly more effective since people have learned the importance of sanitation and personal hygiene. In modern medical practice emphasis is placed on sane, healthful living, and a vigorous campaign is waged against patent medicines and the indiscriminate use of drugs. Fresh air, simple, nourishing food, exercise and a cheerful mind are recommended as modern aids to health. Undoubtedly the general interest now being taken in physical culture, ventilation, dieting, temperance and

the like is tending to reduce the death rate and decreasing the number of invalids.

Related Articles. The general scope of medicine and surgery cannot be covered in a brief article, but the more important branches of the subject will be found treated under the following titles:

Acetanillid	Dogbane	Nightshade
Aconite	Drowning	Nux Vomica
Allopathy	Elixir	Orthopedics
Alow	Emulsion	Osteopathy
Anesthetic	Epidemic	Pepsin
Antidote	Epson Salts	Pharma-
Antipyrene	Ether	copoela
Antiseptic	Extracts	Pharmacy
Antitoxin	Fennel	Phenacetine
Arnica	Fletcherizing	Physical
Arsenic	Fomentation	Culture
Asafetida	Foxglove	Quarantine
Astringent	Gargle	Salol
Bacteria	Gelsium	Sanitary
Bandage	Gentian	Science
Bay Rum	Germ Theory	Sarsaparilla
Belladonna	Glauber's Salt	Sassafras
Bloodroot	Granulation	Scammony
Boneset	Hartman's	Sedative
Caffeine	Solution	Seidlitz
Calabar Bean	Hellebore	Powders
Calomel	Hemlock	Serum Therapy
Camphor	Hernia	Sorrel
Cassia	Homeopathy	Spikenard
Castor Oil	Hospital	Squill
Chamomile	Hydrotherapy	Stethoscope
Chiropractic	Hygiene	Stramonium
Healing	Hysop	Strychnine
Chloral	Iceland Moss	Styptic
Chloroform	Inoculation	Surgery
Cinchona	Insanity	Tannin
Cocaine	Ipecac	Tartar Emetic
Cod-liver Oil	Jalap	Therapeutics
Collodion	Julep	Tonic
Coriander	Laudanum	Tourniquet
Court-plaster	Laughing Gas	Trephining
Cowitch	Liniment	Tumor
Croton	Marshmallow	Vaccination
Cubebs	Massage	Valerian
Diet	Materia	Virus
Digestion	Medica	Vitamins
Disease	Morphine	Vivisection
Disinfectants	Narcotic	Wormwood
Dispensary	Neurotic	Wounds

BIOGRAPHY

Carrell, Alexis	Mayo Brothers
Flexner, Simon	Morton, W. T. G.
Gorgas, William C.	Pasteur, Louis
Jenner, Edward	Reed, Walker
Koch, Robert	Simpson, James Y.
Lister, Joseph, Sir	

MEDICINE HAT, ALBERTA, is on the Canadian Pacific Railroad, and the South Saskatchewan River, 180 miles southeast of Calgary and 657 miles west of Winnipeg. It is the center of a natural gas field and gas is so abundant that it is the fuel of all mills and factories. Coal is also abundant in the vicinity. The manufactures include large flour mills, linseed oil mill, foundry products and pottery. The city has good schools, a high school, Convent and General Hospital. Although weather reports from Medicine Hat have often noted the progress of winter storms, the city does not deserve the reputation given it for severity of climate, for it has a favorable winter temperature. Population, 1936, 9,590.

MEDINA, ma de'nah, ARABIA, a holy city of the Mohammedans, about 250 miles north

of Mecca, revered by the faithful because it contains the tomb of the prophet. Both Mecca and Medina are situated in Hedjaz, formerly a province under the Turkish sultan. In 1916 the independent kingdom of Hedjaz was proclaimed (see ARABIA, subhead *Hedjaz*). Though the pilgrimage to the tomb of the Prophet is not considered by Mohammedans as an imperative duty, yet it is estimated that one-third of the Mecca pilgrims go on to Medina. None except Mohammedans may enter the city. Population, about 48,000.

MEDITERRANEAN, *med i ter a'ne an*, **SEA**, one of the great waterways of the world before history was first written and to-day more important than ever before. The oldest civilizations were on or near its shores, for it is land-locked by Southern Europe, where old Greece and Rome flourished, Asia Minor, where Phoenicia was a great maritime nation, and North Africa, where the old culture of Egypt was carried on its waters to the other continents.

The length of the Mediterranean is about 2,300 miles; its average width is less than 600 miles, but between the Adriatic Sea and Tripoli, it is nearly 1,100 miles. Its area is 813,000 square miles. The Black Sea, through the Bosphorus, the Sea of Marmora and the Dardanelles flows into it, as does the Adriatic Sea, east of Italy. Connection with the Atlantic Ocean, at its western end, is through the narrow Strait of Gibraltar, strongly protected by the mightiest natural fortress in the world (see GIBRALTAR).

The depth of the Mediterranean varies from 1,000 to 14,000 feet in the deepest places; at Gibraltar it is 2,500 feet. Many islands, some of them large—like Corsica, Sardinia, Crete and Malta—were historically important many centuries ago. The small islands of the northeastern part, in the Aegean Sea, connect the age of myth with the historical era. At the southeastern corner the Suez Canal opens a waterway from the Mediterranean to the Red Sea.

MEDULLA OBLONGATA, that portion of the brain which lies below the cerebellum and which forms practically the upper end of the spinal cord. It is pyramidal in shape, about an inch long, and contains a large number of important nerve centers, such as the motor and sensory centers of the cranial nerves and those centers which govern respiration, the action of the heart and many of the functions of digestion, secretion and nu-

trition. Because of this the medulla oblongata is often called the vital knot, a severe injury to this part of the brain resulting in instant death. The medulla is composed of a series of columns which are continuous with the columns of the spinal cord, and it is connected with the cerebellum and the cerebrum by nerve fibers which extend upward to the various brain centers.

Related Articles. Consult the following titles for additional information:

Brain	Cerebrum
Cerebellum	Nervous System

MEDU'SA, in classical mythology, one of the Gorgons, the only one who was not immortal. In her youth she was a very beautiful maiden, but having boasted to Minerva of her beauty and power, she was turned into a hideous monster, with brazen claws and teeth and serpents for hair. She was killed by Perseus. See GORGONS; MYTHOLOGY.

MEERSCHAUM, *meer'shawm*, a white, porous substance composed of magnesium, silica and oxygen, which occurs as a fine, white, compact clay. Its name is a German word meaning *sea foam*, and was applied to this substance because early specimens were found on the seashore in round, white masses, resembling petrified sea foam. It is found in Europe, but is more abundant in Asia Minor. It is manufactured into tobacco pipes, which are white before using but which turn gradually to a rich brown. Meerschaum pipes are so prized by smokers that they readily sell for \$10 to \$15 each.

MEGAPHONE, *meg'a fohn*, a device for increasing the volume of the voice. A common form of megaphone is a funnel-shaped horn used by speakers at expositions, fairs, etc., in making announcements, by advertisers in front of attractions in amusement parks, and by sailors on ships at sea. A megaphone used by partially deaf people is the invention of Thomas Edison. It has two large funnel-shaped receivers which collect the sound waves and direct them into tubes, from which they are carried to the ear.

MEIGHEN, ARTHUR (1874-), Premier of the Dominion of Canada for one year (1920-1921), was born in Anderson, Ont., studied at Saint Mary's Collegiate Institute, then entered the University of Toronto, graduating in 1896. Then followed a career of school teacher and lawyer, in Winnipeg, to which city he went in 1898, and in Portage La Prairie, where he settled in 1902. In 1908 he was elected to the Dominion

House of Commons; in 1913 he became Solicitor-General and in 1917 Secretary of State for Canada and Minister of Mines, passing in the same year to the post of Minister of the Interior. This place he retained until 1920, when he succeeded Sir Robert Borden as Premier, with the distinction of being the youngest man ever to hold that office. In December, 1921, his policies met defeat at the polls; William Mackenzie Lyon King succeeded him.

MEISSONIER, *ma sonnyay'*, JEAN LOUIS ERNEST (1815-1891), a French painter of historical subjects, was born in Lyons. He first became known as an illustrator of books, but rapidly became famous for the singular perfection of his art. His pictures, which are nearly all upon a small scale, are characterized by great minuteness of execution and by high finish, but are not less remarkable for their excellence in composition and breadth of treatment. Among them are *The Smoker*, *Napoleon III at Solferino*, *The Cavalry Charge* and the picture entitled "1807."

MEISTERSINGERS, *mise'tur sing'urz*. See MASTERSINGERS.

MELANCHOLIA, *mel an ko'le ah*. See INSANITY.

MELANCHTHON, *ma lank'thon*, PHILIP (1497-1560), a German theologian and educator, one of the outstanding figures of the Reformation. While professor of Greek at Wittenberg, he met Luther, with whom he became associated in the work of spreading the new religious movement. Melancthon was quiet and studious, quite the opposite of Luther, and often influenced the latter to adopt more moderate views. Because of his mild disposition, Melancthon was able to settle peaceably many differences between the Protestants and the Catholics and to do much for the cause of the Reformation. He is the author of the *Augsburg Confession*, which is the standard of faith for the Lutheran Church although much altered at the present time. His works include a Greek and Latin grammar, biblical commentaries, theological and ethical works.

Related Articles. Consult the following titles for additional information:

Augsburg	Luther	Reformation
Confession		

MEL'BA, NELLIE (1866-1931), an Australian soprano vocalist and grand-opera star. She was educated in Europe, and made her debut at Brussels in 1887. Her first appearance in America was at New York in 1893, as "Lu-

cia;" after that time she was considered in the front rank of operatic sopranos. In 1882 she was married to an Englishman, Charles Armstrong. For services in the World War, she was made a Dame of the British Empire.

MELBOURNE, *mel'burn*, AUSTRALIA, the capital of the state of Victoria. It is situated on the River Yarra, about eight miles from its mouth. The principal streets are wide and well-paved and are lined with handsome and substantial edifices. Among the most noteworthy of the public buildings are the houses of Parliament, the treasury, the law courts, the free library, the mint, the university and the theaters. The place was founded and named in 1837 and was incorporated in 1842. A Centennial International Exhibition was held there in 1888, in celebration of the founding, in 1788, of the Australian colonies. Population, 1933, 992,048.

MELBOURNE, WILLIAM LAMB, Viscount (1779-1848), an English statesman. He succeeded to the premiership in July, 1834, was dismissed in November, but was recalled in the following year. When Queen Victoria came to the throne, it was Melbourne to whom she looked for instruction as to her duties; he was her main political support during the early years of her reign.

MELILOT, or **SWEET CLOVER**, the common name of a group of plants belonging to the Pulse family. These plants resemble alfalfa, having three-lobed leaves and small white or yellow flowers. They have a sweet odor, especially when drying. The yellow melilot grows to a height of three or four feet and is found in damp places. The flowers are used in the manufacture of perfume. This has become a troublesome weed in some districts, owing to its great abundance in pasture land. Increased cultivation of the soil and fertilization will usually prevent its spread.

MELLON, ANDREW WILLIAM (1855-), appointed Secretary of the Treasury in 1921 by President Harding. Born in Pittsburgh, his entire career before entering the Cabinet was devoted to the development of the vast industries in the Pittsburgh district. His enterprises were mostly in coke, coal and iron. His banking interests were very extensive, as were his interests in railroads and steel mills. After eleven years of distinguished service in Washington, he resigned in 1932 to accept appointment as United States Ambassador to Great Britain.

MELODRAMA, *mel o drah'ma*, originally and strictly that form of drama in which the declamation of certain passages is interrupted by music. The term has now come to designate a romantic play in which effect is sought by startling incidents, striking situations and exaggerated sentiment. Melodrama of the cheaper sort is all too common at present, but occasionally a melodramatic play of real merit is produced.

MEL'ON, a general term for several fruits of the gourd family, some growing on trailing vines, but having also some whose vines are climbers. The most important titles are listed below.

Related Articles. Consult the following titles for description of the melons:

Casaba	Muskmelon
Gourd	Watermelon

ME'LOS, or **MI'LO**, an island belonging to Greece, in the Grecian Archipelago, in the Southwestern part of the Aegean Sea. It is one of the Cyclades, and its area is about sixty square miles. Near the site of the ancient town of Melos is a modern town, Plaka. In 1820 a peasant discovered on the island of Melos the celebrated Venus of Milo, which is now in the Louvre, Paris. Population of the island about 5,000.

MELPOM'ENE, in Greek mythology the muse who presided over tragedy. She was generally represented as a young woman, wreathed with vine leaves and holding in her hand a tragic mask. See **MUSES**.

MELTING POINT. When a body changes from the solid to the liquid state through the application of heat it is said to *melt* or *fuse*. *Freezing*, or *solidification*, occurs when the body changes from the liquid to the solid state. The freezing point and the melting point are the same for any given substance. Some substances, like wax and glass, have no sharply-defined melting point. They first soften and then pass more or less slowly into the condition of a thick sticky fluid. Most substances occupy a larger volume in the liquid state than in the solid. A few substances, including water, expand when they become solids. When water freezes its volume increases nine per cent—that is the reason water pipes often burst in winter.

As stated above when a body passes slowly from one state to another, there is no rise or fall in temperature. When a solid fuses, or melts, a quantity of heat disappears, and, conversely, when the liquid solidifies, an equal amount of heat is generated as was

before lost. The heat required to melt one gramme of a substance without a change of temperature is called the heat of fusion. See FREEZING.

MEMBRANES, *mem'braynz*, those tissues of the body which are arranged in thin layers. Membranes are found covering organs, forming the walls or tubes and lining cavities. The principal classes are *serous*, *mucous* and *fibrous*.

Serous membranes as the pleura, pericardium and peritoneum, form a sort of closed sac surrounding certain organs and secrete a small quantity of serous fluid, which allows free action to the organs. These membranes are liable to various diseases, as inflammation, diseased growths and hemorrhage. Serous membranes which line the cavities of joints and the sheaths of tendons and ligaments are called *synovial* membranes.

Mucous membranes line all cavities by which matter is taken into the body or expelled from it, as well as all that communicate with the external air as the digestive apparatus and air passages. These membranes have a soft, velvety surface and secrete such a fluid as best serves the organs they line.

Fibrous membranes include the periosteum, covering the bones; the dura mater, covering the spinal cord and lining the inside of the skull; and the membrane found in the spleen.

MEMEL, TERRITORY OF, consists of the city of Memel and a bit of adjoining territory (area, 1,099 square miles; population, 150,000), facing the Baltic Sea. The World War treaty took it from Germany, and the people voted to join Lithuania after administration for three years under the League of Nations. In accordance with the people's desire, the Memel territory was made an autonomous state, under control of Lithuania, and Memel port was internationalized (made free to all nations).

MEM'LING, HANS (1430?-1494), one of the greatest of early Flemish painters. In his study he became a pupil of Van der Weyden, whom he surpassed. The figures of women in his pictures are especially attractive and are noted for the beauty and refinement of their faces. He is also noted for the detail and accuracy of his drawings. Many of his paintings are in Bruges, where he lived. His *Virgin and Infant Jesus* and *Marriage of Saint Catherine* are in the Louvre, Paris. Other works are *The Madonna and Infant Christ Enthroned*, *Saint Lawrence* and *Saint*

John the Baptist, and *Saint Christopher and the Infant Christ*.

MEM'NON, a king of the Ethiopians, mentioned in the Homeric poems as coming to the aid of Troy against the Greeks. He slew Antilochus, but was himself slain by Achilles. The name was later given to a statue still standing at Thebes, in Egypt, which was one of two known from their size as the *Colossi*. This statue, known as "the vocal Memnon," was celebrated in antiquity as emitting a musical sound every morning at the rising of the sun. The ancients did not know it, but the phenomenon was due to the action of the sun's rays, which rapidly changed the temperature of the damp, porous stone. See COLOSSUS.

MEMORIAL DAY, a day solemnly set apart in the United States to honor the memory of its soldier-dead, by decoration of graves with flowers and by appropriate memorial exercises. The first Memorial Day was in 1869, when General John A. Logan, as commander in chief of the newly-organized Grand Army of the Republic, designated May 30 as a day to honor Union soldiers who had died. That date is still retained in the North, but in the South, where the custom is also maintained, an earlier date, usually April 26, is observed. Today graves of Spanish-American War and World War victims receive like honors, at home or in France.

MEM'ORY, the power of mind by which we retain, recall and re-know mental experiences. A complete act of memory has three phases, usually known as retention, recollection and recognition. If any one of these is missing, the act is of little or no value. Memory is the result of a fundamental law of the nervous system, namely, a tendency of the nerves to act again in the manner in which they have already acted. Memory is not a distinct intellectual power, with a special site or special center in the brain, as formerly supposed. It has a physical as well as an intellectual basis, and as many centers as there are avenues of knowledge. Each sense, each mental power, each train of thought and feeling has its memory.

Laws of Memory. Ideas in the mind are recalled to consciousness according to two methods of association; namely, by contiguity, or simultaneity, and by similarity.

The Law of Contiguity. According to this law, ideas are recalled according to their association in time and place. Ideas which ac-

company each other in close succession are usually reproduced in the order of their occurrence. A child soon learns that fire is accompanied by heat, and the idea of one will recall the idea of the other. The idea of a part suggests the idea of the whole, as a boiler suggests an engine; a wheel, a wagon; a leaf, a tree. The order of sequence is important under this law. We recall with less effort those ideas which occur in the order of logical connection or in the order in which we are accustomed to associate them. One will recall the letters in the alphabet in the order of a, b, c, with little or no effort, but if he attempts to recall them in any other order, a serious effort is necessary. This law of memory closely associates memory with reason and embodies the relation of cause to effect, as lightning suggests thunder; a tree in blossom, the fruit. Conversely, effects suggest causes, as the eating of the fruit may suggest the tree in blossom.

Law of Similarity. According to this law, similar ideas tend to recall each other. A stranger may recall a friend because he resembles him in appearance. One river recalls another; one journey, another, and so on. The law of similarity has a less extensive application than the law of contiguity; yet it is important because it enables many ideas to be reproduced which cannot be recalled by the law of contiguity. Ideas reproduced by similarity do not necessarily occur simultaneously in time and place.

Kinds of Memory. Psychologists frequently recognize two kinds of memory, based upon the two primary laws of association. The memory based upon the law of contiguity is usually known as a logical, or thinking, memory. The careful culture of this memory leads one to associate cause and effect and to depend more upon his powers of reasoning and judgment for arriving at conclusions than upon his ability to recall ideas mechanically. The memory based upon the law of similarity is more of a mechanical memory and tends to arrange ideas in series and then recall them in a certain order, whether or not this order is logical. Many illustrations of this sort of memory are found among school children, such as committing the multiplication table, regardless of the process by which the results are obtained; the memorizing of the rules in arithmetic, grammar and other subjects without a knowledge of their meaning or ability to apply them.

Because the mechanical memory is abused, it is often considered an evil, yet it is necessary to the complete development of the memory, and when properly guarded it is a source of mental strength.

Cultivation of Memory. Memory is one of the most important of the mental powers. Without it, it would be impossible to retain knowledge and one would be unable to profit by his experiences. Memory develops early in life, and through childhood and youth it should receive careful attention. Its cultivation can be assisted by adhering to the following principles:

(1) Useful memory depends upon sensation, perception, and thinking. Unless these powers are properly developed, the things remembered will be wrong.

(2) The order of the processes in the acquisition of an idea is as follows: (a) Observation; (b) thought (forming concepts); (c) application. In cultivating the memory, these three phases of its use should be carefully considered. Like every other power, memory is strengthened by use, and unless children are required to reproduce their ideas they never form the habit of doing this easily and correctly.

(3) Habits of reading become means of strengthening the memory. If a child reads thoughtfully, with the purpose of retaining the ideas, and follows his reading by the reproduction of those ideas, his memory is strengthened. For this reason it is valuable training to require children to reproduce their exercises in school, either orally or in writing.

(4) The laws of memory are somewhat the same as the laws of learning, that is, things can be remembered best when they are learned according to these laws (see Psychology).

(5) Memory is not a general factor. That is to say, if a person has a good memory for the facts of history, he may or may not have a good memory for poetry, science, or any other subject. Memory in any subject must be developed in that subject. That is the most modern result of experimental studies of memory. It quite upsets the old idea that learning history, geography, and poetry developed the memory. It did so for those three subjects, but not for anything else.

(6) Memory is aided by repetition. If the repetition is so planned that the mental process is not different from the original act of learning, it is a great aid to the memory. Teachers in planning reviews should bear this principle in mind. The review should enable the pupils to recall the subjects in the order in which the different topics were learned, and it should never contain more than the mind can grasp and hold at one time.

(7) The memory image, however vivid, is always fainter than the original; therefore, care should be taken to see that the child

obtains as clear and complete ideas as possible.

(8) Childhood is the age for developing and strengthening the memory. During the school life of the child it is well for him to memorize some things which he does not fully understand, because as the reasoning powers develop and he extends his field of knowledge, these subjects will be fully apprehended.

(9) The mechanical memory is essential to the child and in some cases to the adult. The danger in its use lies in the liability to rely upon it after the logical memory should take its place.

Related Articles. Consult the following titles for additional information:

Association of ideas	Habit	Perception
Attention	Interest	Psychology
Mind	Concept	Sensation
	Thought	Reason

MEMPHIS, *mem'fis*, an ancient city of Egypt, on the west bank of the Nile, about twelve miles south by west of Cairo. It is said to have been founded by Menes, the first king of Egypt, but this is doubted. It was a large and splendid city, and after the fall of Thebes was the capital of Egypt. The pyramids and tombs of Sakkara and the colossal statue of Rameses II are the chief objects of interest on the site.

MEMPHIS, TENN., the largest city in the state and the county seat of Shelby County, on the Mississippi River and on the Missouri Pacific, the Illinois Central, the Yazoo & Mississippi Valley, the Southern, the Chicago, Rock Island and Pacific, the Saint Louis-San Francisco, the Louisville & Nashville, the Nashville, Chattanooga & Saint Louis, the Mobile & Ohio and the Saint Louis Southwestern railroads. The municipal airport and several motorbus lines serve the city. Seven barge lines and two packet companies furnish water transportation.

Nearly 600 manufactories are producing about \$200,000,000 worth of goods annually; these include cottonseed products, hardwood products, mixed feeds, automobile bodies and parts, furniture and mattresses; the city is a distributing center for drugs and chemicals, dry goods and clothing, and is one of the greatest cotton markets in the world.

The chief educational institutions are the colleges of medicine, dentistry, pharmacy and nursing of the University of Tennessee, the State Teachers College, LeMoyne Junior College for Negroes, Southwestern University, the Museum of Natural History and Industrial Arts, and the Brooks Memorial

Art Gallery. There are 321 churches and 20 hospitals. Other important buildings are the post office and Federal building, the courthouse, the criminal courts building and the municipal auditorium.

The city maintains 39 parks covering 1,379 acres and one of the best zoos in the country.

In 1541 De Soto established a settlement on the site of Memphis twenty-four years before the founding of Saint Augustine in Florida. The first fortification was erected in 1739. As a trading post Memphis grew rapidly as soon as the production of cotton brought traffic on the Mississippi River. Population, 1930, 253,143.

MENCKEN, HENRY LOUIS (1880-), an American editor and critic, a native of Baltimore, where he was educated. He began his career as a reporter in Baltimore, and became a city editor. In 1916-17 he was a correspondent attached to the German army, then served as literary critic on *Smart Set*. He founded *The American Mercury*, and was its editor from 1924 to 1933; he made it a journal of protest. He was contributing editor to a number of liberal magazines and periodicals.

MENDELSSOHN-BARTHOLDY, *men'-del sone bahr tole'dy*, FELIX (1809-1847), one of the world's best loved composers, was born at Hamburg, Germany. In his ninth year he publicly appeared in Berlin, and in his sixteenth year produced the well-known overture to the *Midsummer Night's Dream*. In 1829 he began an extensive tour through England, Scotland, France and Italy, and on his return to Germany became musical director in Düsseldorf. In 1835 Mendelssohn was chosen conductor of the famous concerts in the Gewandhaus of Leipzig and later received several royal appointments, which made the last years of his brief life a continuous triumph.

His music is delicate and melodious, and because it is not too technical is greatly enjoyed by the general public. His best works are *Songs Without Words* (including the well-known *Spring Song*), the oratorios *Saint Paul* and *Elijah*, the *Midsummer Night's Dream* overture and cantata to Goethe's *First Walpurgis Night*.

MENDICANT ORDERS, religious orders whose members take special vows to renounce all worldly possessions. They do not, however, solicit alms or live by begging, though *mendicant* means, literally, *one who begs*. To

the mendicant orders belong the Dominicans, Franciscans, Augustinians, Carmelites and Servites.

MENDOZA, *men doh'sah*, ARGENTINA, founded in 1560, the fifth city in size in the republic, is situated 650 miles west and north of Buenos Ayres, at the base of the Andes Mountains. One of Argentina's national colleges, normal schools for both sexes and an agricultural institute are located here. The city is the meeting point of trade of the country with that of Chile. Population, 1930, 76,780.

MENELA'US, in Greek mythology, the brother of Agamemnon and husband of the beautiful Helen, with whom he received the kingdom of Sparta. His wife was carried off by Paris, son of Priam, king of Troy, and in accordance with a previous oath, the Greek princes joined Menelaus in his effort to avenge the affront. Menelaus himself led sixty ships to the siege of Troy. After its conquest he returned with Helen to his native land in a devious voyage which led him to Cypria, Phoenicia, Egypt and Libya, and thereafter he ruled happily until his death. See HELEN, MYTHOLOGY, subtitle *The Trojan War*.

MENHA'DEN, or **MOSS'BUNKER**, an American salt-water fish of the herring family. It abounds on the shores of New England, where it is taken in large quantities and used for fertilizer and as the source of a valuable oil. Since a method for extracting the bones has been discovered, the menhaden has become a valuable food fish and is preserved in the same way as sardines. This remarkable fish is known in different localities by different names; *pogy*, *whitefish*, *bunker*, *fat-back*, *yellow-tail* and *bony fish* are but a few of them.

MENINGITIS, *men in jī'tis*, a general term applied to several diseases having their seat in the membranes of the brain and spinal cord. Of these the most serious is *epidemic cerebrospinal meningitis*. It is caused by a germ first isolated in 1887. Lack of sanitation and overcrowding offer especially favorable conditions for its spread. The germ sets up a violent inflammation of the membranes of the spinal cord and the brain, causing terrible pains in the head, and abnormally stimulating the nerves. Sometimes dark spots form on the body, giving rise to the name "spotted fever." Contraction and rigidity of the muscles occur, and the head and neck are

drawn back until the spine sometimes doubles upon itself. Delirium, paralysis and death follow in quick succession in unchecked cases.

Fortunately, a specific remedy to control the disease was discovered by Dr. Simon Flexner. After considerable experimentation, beginning in 1905, he produced a serum which has greatly reduced the death rate and has also eliminated the after-effects of cases that recovered. Among these effects were blindness, deafness, paralysis and feeble-mindedness.

MEN'NONITES, THE, a Protestant sect, founded at Zurich in 1525. The doctrines spread rapidly through Switzerland, Germany and Austria. As a result of persecution, about 3,000 perished and many went to Moravia and Holland. Menno Simons (1492-1561), a native of East Friesland, gave the society its name through his efforts to unite the sects into which it had broken up. In the latter part of the seventeenth century a number of Mennonites emigrated to America, and settled at Germantown, Pa. In 1871 many more came to the United States from Russia, to avoid conscription for the army of the czar, and settled in Minnesota and Kansas. These people refuse to take oaths and to bear arms. They pay much attention to the ordering of their lives on Christian principles and are cultured, honest and charitable. A total of 58,000 members in the United States and 88,765 in Canada is reported.

MENOM'INEE, meaning *wild rice men*, is the name of a tribe of Algonquian Indians once occupying Northern Wisconsin. Of the remnant, about 1,600 now live on a reservation near Green Bay.

MENOMINEE, MICH., the county seat of Menominee County, fifty-two miles northeast of Green Bay, Wis., on Green Bay at the mouth of the Menominee River, opposite Marinette, Wis., and on the Chicago & North Western, the Chicago, Milwaukee, Saint Paul & Pacific and the Wisconsin & Michigan railroads and the terminus of the Ann Arbor Railroad car ferry. The city is a great lumber-shipping port, contains many saw and planing mills and manufactures electrical apparatus, shoes, paper, boilers, machinery and other articles. It has a public library, a hospital and a four-year junior college. The place was settled in 1799. Population, 1920, 8,907; in 1930, 10,320.

MENSURATION. This word is a noun meaning the act, the process, or the art of

measuring. Mensuration is a branch of geometry and is limited to finding the length of lines, areas of surfaces and volumes of solids, having given certain facts of lines and angles. The underlying principles on which the rules which apply to mensuration are based cannot be entirely understood by the student of arithmetic. Some of these rules may be worked out by arithmetical processes while others require involved application of geometrical formulas.

That part of arithmetic devoted to mensuration is very practical. Common measures of lines, surfaces and solids enter into the calculations of men every day of their lives, and all should be familiar with these common principles.

Definitions. The student should become familiar with the meanings of the terms explained below:

Polygon. A polygon is a plane figure bounded by straight lines. If it has three sides it is a triangle; four sides a quadrilateral; five sides, a pentagon; six sides, a hexagon; seven sides, a heptagon; eight sides an octagon, etc. A polygon having four sides, and called a quadrilateral is also called a rectangle if all the angles of the figure are right angles. It is called a parallelogram if the opposite sides are parallel. The figures A and B below represent a rectangle and parallelogram respectively:

Formula. To find the area of a rectangle it is only necessary to multiply the base by the altitude. The same rule applies to the parallelogram. In the figure above, showing the parallelogram, AB is the base and DE is the altitude. It contains the same area exactly as a rectangle having a base equal to AB and an altitude equal to DE.

Any parallelogram may be divided into two equal triangles, and it follows, then, that the area of one of these triangles is one-half the area of the entire parallelogram. It is evident then, that the area of any triangle is the product of the base by one-half the altitude.

Circle. Cut a circle from stiff paper with a diameter of 4 inches. Mark it off into triangles as shown in the half circle in the second column. The bases of the triangles form what part of the circle? The altitude of each triangle corresponds to what part of the circle? If we are able to find the name of a triangle, can we then find the area of the circle?

The altitude of a triangle is the perpendicular distance from the base to the farthest opposite point. In the triangle above, the line AB is its altitude. Since we know how to

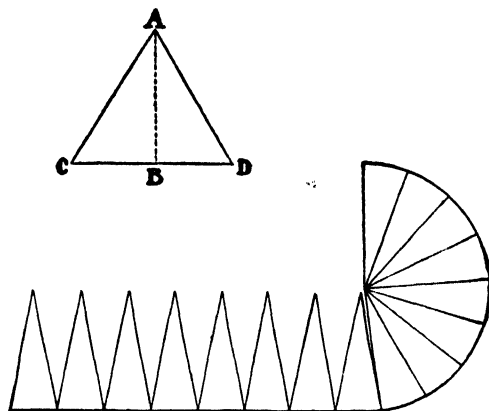


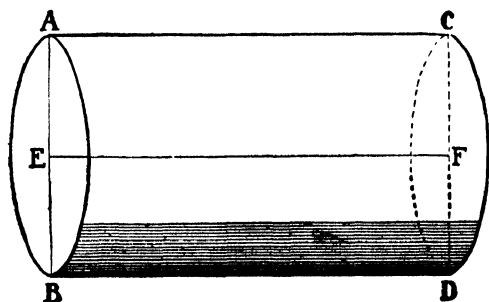
ILLUSTRATION OF CIRCLE

find the area of one triangle, we can find the areas of as many triangles as we have made from our circle. Therefore, to find the area of a circle:

Find the area of one of the triangles and multiply by the number of triangles, or in briefer form, multiply the circumference of a circle by half its radius.

The Cylinder. A cylinder is a round body with equal and parallel circles for its bases and having a uniform diameter. In the accompanying figure the line EF represents the altitude, AB the diameter. The convex surface is the curved exterior.

To find the convex surface of a cylinder multiply the circumference of the base by its altitude. You can easily understand the reason for this rule if you can imagine that



THE CYLINDER

the entire outer surface can be changed in shape so that it lies flat as a rectangle. The area of a convex surface of a cylinder is the same as the area of such a rectangular figure.

To find the volume of a cylinder multiply the area of the base by the altitude. The area of the base is the area of one of the circles forming the base, and above we explained how to find the area of a circle.

Common Measurements. On this and the following pages will be found the principal short rules in use in connection with common measurements.

Measures of Capacity. To find the number of bushels of grain in a bin or box, multiply the length in feet by the height in feet, then by the width in feet and then by 8, striking

together and divide the product by 4. For instance:

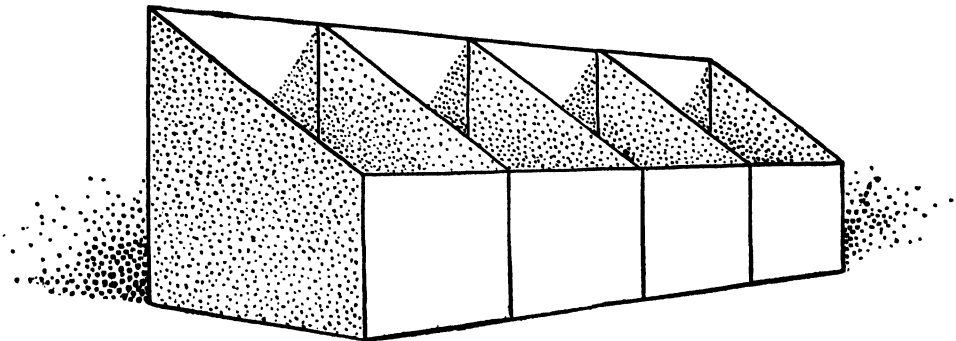
A cistern is 6 feet wide, 8 feet long and 4 feet deep; multiply together equals 192. $192 \div 4 = 48$ barrels of $31\frac{1}{2}$ gallons each.

A tank 5 feet square will hold 6 barrels for every foot of depth.

A tank 6 feet square will hold $8\frac{1}{2}$ barrels for every foot of depth.

A tank 7 feet square will hold $11\frac{1}{2}$ barrels for every foot of depth.

A tank 8 feet square will hold $15\frac{1}{2}$ barrels for every foot of depth.



off the right hand figure. The result obtained will be the number of bushels. For instance. In a bin 10 feet long, 6 feet high and 8 feet wide, $10 \times 8 \times 6 \times 8 = 384$.

A tank 9 feet square will hold $19\frac{1}{2}$ barrels for every foot of depth.

A tank 10 feet square will hold $23\frac{1}{2}$ barrels for every foot of depth.



To find the approximate contents of a round bin or tank, take three-fourths of the square of the diameter, and multiply by the depth and then by $2\frac{1}{2}$, pointing off one decimal place. For example: a tank 6 ft. in diameter and 10 ft. deep contains $\frac{3}{4} \times 6^2 = 10 \times 2\frac{1}{2} = 67.5$ barrels.

In estimating the contents of a cistern, one barrel is equal to $31\frac{1}{2}$ gallons and one hog-head to 2 barrels.

To find the number of barrels a cistern will hold, multiply the square of the diameter of the cistern in feet by the height in feet and divide this result by 4. For instance, if a cistern is 6 feet in diameter and 8 feet deep it will hold $6^2 = 36$. $36 \times 8 = 288 \div 4 = 72$ barrels.

To find the number of barrels in a square cistern, multiply the width, height and depth

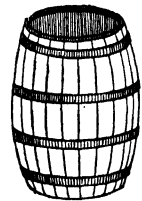
To find the medium diameter of a cask or barrel, add to the head diameter $\frac{2}{3}$ of the difference between the head and bung.

Land Measurement. A regular township, according to United States surveys, is 6 miles square and is divided into 36 equal parts or sections, each section containing 640 acres and measuring one mile square (see LANDS, PUBLIC).

To fix permanently these values in the pupil's mind, a few exercises can be given in connection with the study of this diagram, such as:

How many acres of land in $4\frac{1}{2}$ sections?

How many more acres in $7\frac{1}{2}$ sections than there are in 3 sections?



How many acres of land in $\frac{1}{2}$ section?
 How many acres of land in $2\frac{1}{2}$ sections?
 How many acres of land in 5 sections?
 How many more acres in $3\frac{1}{2}$ sections than
 in 2 sections?

Six		N		miles	
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36
1 mile		S			

To familiarize the pupils with the different divisions of a township, have them make diagrams showing farms located in different parts of the section. Help on this work will be found in the article LANDS, PUBLIC.

Lumber Measurements. Farmers, carpenters, and masons make use of short methods of arriving at results. In making estimates they use the following data:

A board foot, used in measuring lumber, is 1 foot long, 1 foot wide and 1 inch thick.

In computing dimensions of lumber, do not use fractions. A board measures between 5 and 6 inches in width; if nearer 5 call it 5 inches, and if nearer 6, call it 6.

To find the number of feet in a number of 12-foot boards, find the total width of the boards in inches and the sum will equal the number of feet in the pile.

To find the number of feet in a number of 14-foot boards, add to the total widths of the boards 1-6 of the sum obtained.

To find the number of feet in 16-foot

boards, add to the sum of the widths of the boards $\frac{1}{2}$ of the result. For example: To find the number of feet in 6 boards 8 inches wide and 14 feet long, $6 \times 8 = 48$. $1-6$ of 48 = 8. $8 + 48 = 56$ feet, the number of feet contained in the boards.

To find the number of feet of lumber contained in a fence, multiply the sum of the widths of the boards in a portion of the fence by $16\frac{1}{2}$ and if more than 1 inch thick by the thickness, and divide by 12. The result obtained will be the number of feet contained in a rod of fence and this multiplied by the number of rods of fence will give the number of feet of lumber used. To illustrate:

To find how much lumber will be required to fence a square mile of land with three 6-inch boards and one 10-inch board in each panel of fence: $3 \times 6 + 10 = 28$ inches, total width of boards in each panel. $28 \times 16\frac{1}{2} \div 12 = 38\frac{1}{2}$ feet in each rod of fence. The number of rods of fence around a square mile of land equals 1,280 rods multiplied by $38\frac{1}{2} = 49,280$ feet, number of feet of lumber in the fence.

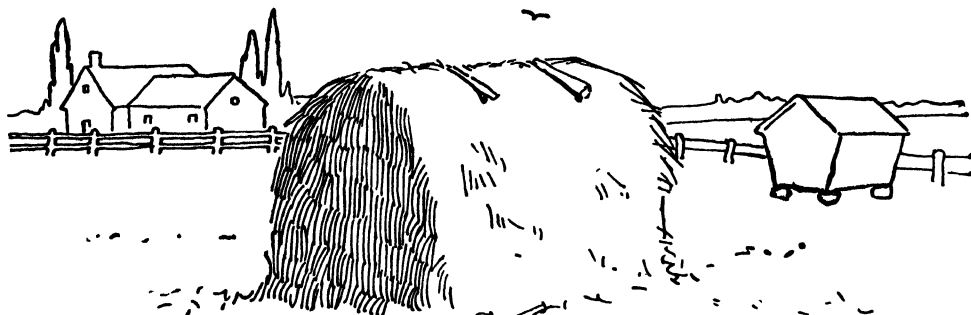
To find the number of laths required in a room, find the number of square yards in the

N. $\frac{1}{2}$ (320 A.)		
N.W. $\frac{1}{4}$ of S.W. $\frac{1}{4}$	N.E. $\frac{1}{4}$ of S.W. $\frac{1}{4}$	S.E. $\frac{1}{4}$
S.W. $\frac{1}{4}$ of S.W. $\frac{1}{4}$	S.E. $\frac{1}{4}$ of S.W. $\frac{1}{4}$	160 A.

room and multiply by 18, for 18 laths are generally used to a square yard.

Measures for Crops. A ton of dry hay is estimated at 500 cubic feet to the ton.

To find the number of tons in a mow, multiply the length in feet by the height in feet and then by the width in feet and divide the result by 500. To illustrate: In a mow 30 feet long, 10 feet high and 20 feet wide there will be $30 \times 10 \times 20 \div 500 = 12$ tons.



To find the number of tons in a stack, multiply the width in feet by the length in feet by $\frac{1}{2}$ the height and divide by 500. For example: A stack 20 feet long, 10 feet high and 15 feet wide will contain $15 \times 20 \times 5 \div 500 = 3$ tons in the stack.

To find the contents of a round stack, multiply the distance around the stack in yards by itself and then multiply by 4 times the height in yards, striking off two places from the right of the result thus obtained. This gives the number of cubic yards in the stack and by dividing by 20 will give the number of tons. To illustrate: A stack 20 yards around and 8 yards high will contain $20 \times 20 \times 32 = 12800$. $12800 \div 20 = 640$ tons.

To find the contents of a crib in bushels of shelled corn, multiply the number of cubic feet in the crib by 8 and strike off the right hand figure. To illustrate: A crib 18 feet long, 10 feet high and 8 feet wide will contain $18 \times 10 \times 8 \times 8$ or 11520 bushels.

To find the number of heaped bushels of ear corn contained in a crib, multiply the number of cubic feet in the crib by 4 and strike off the right hand figure, as, a crib 15 feet long, 10 feet high and 8 feet wide will contain $15 \times 10 \times 8 \times 4$ or 4800 bushels.

When the sides of the crib are flared, multiply the height in feet by half the sum of the top and bottom widths and then multiply by the length in feet, multiplying the result by 4 and striking off the right hand figure. For example: A crib 12 feet wide at the top, 3 feet wide at the bottom, 14 feet long and

10 feet high will contain $12 + 3 \div 2 = 10$ feet, average width. $10 \times 10 \times 14 \times 4 = 5600$ bushels.

General Rules in Mensuration. To find the slant height of a cone when the diameter of the base and the altitude are given, extract the square root of the sum of the squares of the altitude and one-half the diameter.

To find the area of the convex surface of a regular pyramid or cone, multiply $\frac{1}{2}$ the sum of the perimeter of the two bases by the altitude.

To find the area of the surface of a sphere, multiply the circumference by the diameter.

To find the volume of a sphere, multiply the convex surface by $\frac{1}{3}$ of the radius.

To find the area of a parallelogram, multiply the base by the altitude.

To find the area of a triangle, multiply the base by $\frac{1}{2}$ the altitude.

To find the area of a trapezoid, multiply $\frac{1}{2}$ the sum of the parallel sides of the altitude.

To find the area of a polygon, divide into triangles and find the sum of their areas.

To find the area of a circle, multiply the radius by $\frac{1}{2}$ the circumference.

To find the circumference of a circle, multiply the diameter by 3.1416.

To find the hypotenuse of a right-angled triangle, when two dimensions are given, extract the square root of the sum of the squares of the three dimensions.

To find the base or perpendicular of right-angled triangle, from the square of the hypotenuse subtract the square of the given side and extract the square root of the remainder.

To find the volume of a pyramid or cone, multiply the area of the base by the altitude and divide by 3.

To find the convex surface of a cylinder, multiply the circumference of one base by the altitude.

To find the volume of a cylinder, multiply the area of one base by the altitude.

To find the volume of the frustum of a regular pyramid or cone, multiply the sum of the areas of the two bases plus the square root of their product by $\frac{1}{3}$ the altitude.

To find the contents of an irregular body immerse the body in a vessel full of water, and measure the quantity of water displaced.

To find the area of a rectangle, multiply the length by the breadth.

To find the diameter of a circle, divide the circumference by 3.1416; or multiply it by .318309.

To find the side of a square equal to a given circle, multiply the diameter by .886227 or $\frac{1}{2}$ of $\sqrt{3.1416}$.

To find the diameter of a circle equal to a given square, multiply the side of the square by 1.12838.

To find the side of an inscribed square, multiply the diameter by .707106, or the circumference by .225079.

To find the circumference from an inscribed square, divide the side of the square by .225079.

To find the side of the largest inscribed equilateral triangle, multiply the diameter by .866025.

To find the diameter of the three largest equal circles that can be inscribed in a given circle, divide the diameter of the given circle by 2.155.

To find the contents of a cube, multiply three sides together.

To find the surface of a cube, multiply the square of the length of one of its sides by 6.

Related Articles. Consult the following titles for additional information:

Angle	Cylinder	Rectangle
Arithmetic	Geometry	Rhombus
Circle	Polygon	Sphere
Cone	Prism	Square
Cubic Measure	Pyramid	Triangle

MENTAL DEFECTIVES. See FEEBLE-MINDED, EDUCATION OF THE.

MENTOR, the faithful friend of Ulysses, to whom Ulysses entrusted the care of his domestic affairs during his absence in the war against Troy. The education of the young Telemachus fell to his charge, and the wise and prudent counsel which he gave the youth has made his name the synonym for a wise counselor. See ULYSSES.

MEPHISTOPHELES, *mef is tof' e leez*, the name of a demon in the old puppet plays, adopted by Goethe in the first part of *Faust*. Although the name since Goethe's time has

been commonly used as a name for the devil, the Mephistopheles of Goethe has few of the characteristics which, in the ordinary belief, belong to Satan.

MERCANTILE AGENCY. See COMMERCIAL AGENCY.

MERCATOR'S PROJECTION. See MAP.

MERCOERIZING, *mer'ser izc ing*, a chemical process named from its originator, John Mercer, of Lancashire, England. It is used to give a silky finish to cotton fabrics, and consists in treating the fibers with caustic soda or caustic potash. By treating the cloth under tension the fibers are kept from shrinking. The lustrous effect is caused by reflection of light from the surface of the fabric, and this is brought about by a change produced in the fibers. By mercerizing they become straight and translucent, whereas formerly they were flat, spiral tubes. Mercer obtained his patent in 1850.



MERCHANT MARINE.

The combined tonnage of vessels of any nation which are engaged in carrying its commerce on the seas is called its merchant marine. The vessels engaged are among the common carriers of the ocean.

The seas are the great highways of international trade, and those nations which possess large numbers of carrying vessels are the richest and most powerful. The United

States may appear to be an exception to this general rule; its merchant marine was allowed to decline for many years, yet it has prospered in its foreign commerce by being able to engage ships from other nations to carry its products.

Before the Revolutionary War the American ports of Boston, New York and Philadelphia were the homes of more sailing vessels than were owned in Liverpool, London and Glasgow. In 1800 England's tonnage was twice that of the young American republic, and it increased rapidly until Great Britain owned the world's greatest merchant marine. This was natural, and the condition was essential, for Britain's possessions encircle the globe, and there must be facilities for uninterrupted trade relations between the

mother country and its dependencies. British ships are found in every port in the world, while the American flag for many years was seldom seen in foreign waters.

Before the World War (1914-1919) Germany possessed the second largest merchant marine that sailed the seas, the result of growth of scarcely more than thirty years, but during the war many of her largest and most valuable ships were seized by other nations or destroyed. In recent years Germany has made a strenuous effort to resume her former position on the high seas. Many new and speedier liners, like the *Bremen* and *Europa*, have been placed in the Atlantic passenger trade, the gross tonnage of her merchant fleet now being over 3,700,000 tons.

The United States. There is reference above to the strength of the country's early merchant marine. The Civil War (1861-1865) dealt so severe a blow to its commerce that there never has been complete recovery. Subsidies (see **SUBSIDY**) were repeatedly solicited, that American enterprise might build ships and sail them without loss, but they were for a long time refused. The World War created a tremendous demand for vessels of all classes; American shipyards were quickly manned, and the building of boats was begun with feverish haste. Hundreds of vessels of both steel and wood were contracted for, and before the end of the war many of them were put into commission. Favorable legislation assisted plans for new construction. In recent years many new and large vessels have been launched, and by 1936 the American merchant fleet comprised about 4,000 craft with a total gross tonnage of over 13,600,000, thus ranking second to Great Britain's 10,000 ships of a gross tonnage of 23,300,000. Japan's fleet numbers about 2,000 of over 4,000,000 tons.

Losses in the War. Germany's submarine warfare reduced the world's shipping during the World War over 15,000,000 tons. During the same period about 10,850,000 tons were constructed, and 2,400,000 tons of German boats were used by the allied nations or were purchased from neutrals. The net loss in tonnage was therefore about 1,800,000 tons during war. Britain suffered most heavily; its gross loss in tonnage was nearly 11,000,000 tons, and its net loss about 3,500,000 tons. Neutral Norway, which had the third largest tonnage of any country, was the next greatest loser during the war. In 1919 the United

States owned one-fifth of the world's merchant marine; the figures remain unchanged.

Related Articles. Consult the following titles for additional information:

Commerce High Seas Ship

MERCHANT OF VENICE, THE, one of the most popular and most interesting of Shakespeare's comedies, written in or about the year 1597. The plot was drawn from several sources, among which may be mentioned Marlowe's *Jew of Malta*. The play is in five acts. The story, in brief, is as follows:

Antonio, a merchant of Venice, becomes surety for a friend, Bassanio, who borrows from a Jewish money-lender, Shylock, the sum of 3,000 ducats. The Jew makes a peculiar bargain, to the effect that if the money is not repaid within three months Antonio shall forfeit a pound of flesh. The delay of Antonio's ships makes repayment within the specified time impossible, and Shylock demands his pound of flesh. At the trial Portia, the heroine, in the garb of a lawyer, presides over the case and declares that the Jew may have his pound of flesh, but that he shall forfeit all his lands and possessions if he sheds one drop of Christian blood in taking the pound. Thus he is outwitted in his plot to cause Antonio's death.

Supplementing the main thread of the story are the narrative of the three caskets and the story of Shylock's daughter Jessica, who runs away with a suitor and carries off her father's money.

MERCIER, *mair sya'*, HONORÉ (1840-1894), a Canadian politician, born at Saint Athanase, Quebec. He was educated at Jesuits' College, Montreal, and studied law, but engaged in journalism. He sat in the Dominion parliament from 1872 till 1874, became solicitor general, was a member of the legislative assembly of Quebec in 1879 and became attorney-general and premier in 1887, at the head of a coalition of Liberals and Clericals.

MERCURY, *mur'ku ry*, or **QUICK'SILVER**, a metal, heavier than any other excepting the platinum metals, gold and tungsten, and the only metal which is liquid at ordinary temperatures. Because of the extensive range between its freezing and its boiling point and because of its fluidity, it is well adapted for use in barometers and thermometers, which allow for its expansibility under heat. At 37.9° below the zero of Fahrenheit, it freezes, and under a heat of 675° it rises in fumes and is gradually converted into a red oxide. Mercury is prepared principally from cinnabar (red sulphide of mercury) by heating,

combined with condensation of the vapors. In its metallic form, as well as in its salts, it is poisonous, and chronic poisoning is liable to afflict persons who work continuously about the metal.

Preparations of this metal are among the most powerful poisons and are extensively used as medicine. In its fluid state, mercury combines readily with most of the metals, to which it imparts a degree of fusibility or softness. This quality of combination makes it a useful factor in methods of extracting metals from their ores. An alloy of mercury and any other metal is called an amalgam. Mercury is sometimes found in its fluid state, but usually it occurs as the sulphide. About one-third of the mercury used in the world comes from Spain, but it is also found in Germany, Italy, China, Borneo, Mexico and Peru. California, Texas and Oregon produce some mercury, the largest supply coming from California.

Related Articles. Consult the following titles for additional information:

Amalgam	Cinnabar
Antidote	Corrosive Sublimate
Barometer	Thermometer

MERCURY, the planet nearest the sun and the smallest of the major planets. Its diameter is about 3,000 miles, which makes the planet about three times the mass of the moon. Mercury moves round the sun in a little less than 88 of our mean solar days, at a mean distance of about 35,392,000 miles. At its nearest approach to the sun it is about 29,000,000 miles away, and at its furthest point, more than 43,000,000 miles from it. The period of its axial rotation is 24 hours, 5 minutes and 28 seconds. Its volume is about one-seventeenth that of the earth, and its density is one-tenth greater than that of the earth. When farthest east of the sun, it is visible to the naked eye in spring and autumn, after sunset and before sunrise.

Mercury is a difficult planet for astronomers to study, and very little is known concerning it. At intervals of from three to thirteen years it is seen to pass across the sun's disk, and this transit is always studied very carefully, for it shows clearly the laws that govern the planet's motion. It has an atmosphere less dense than that of the earth.

Related Articles. Consult the following titles for additional information:

Astronomy	Planet	Earth
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MERCURY, in Roman mythology, the son of Jupiter and Maia, and the messenger of the gods; in Greek mythology he is called

Hermes. When he was but a few hours old he sprang from the knees of his mother, seized a tortoise shell and stretched strings across it, thus inventing the lyre. Before night he had stolen the oxen of Admetus, which Apollo was tending, and had hidden them so securely that Apollo could not find them. Mercury was obliged to confess where he had concealed the animals, and in return for the two which he had eaten he gave to Apollo his newly invented lyre. Apollo, pleased with the gift, presented Mercury with the caduceus, which became his most characteristic symbol. Jupiter also presented him with a winged cap, winged sandals and a short sword, by means of



MERCURY

From the bronze statue by John of Bologna.

which he could make himself invisible and could transport himself to any place in the twinkling of an eye. One of Mercury's duties was to conduct the souls of the dead to Hades. He was also the god of commerce and of eloquence.

MERCURY, BICHLORIDE OF. See **CORROSIVE SUBLIMATE**.

MERCY, SISTERS OF, the name given to members of female religious communities founded for the purpose of nursing the sick at their own homes, visiting prisoners, superintending the education of females and performing similar acts of charity and mercy. Communities of Sisters of Mercy are now widely distributed over America and Europe, and the name is borne specifically by a Roman Catholic sisterhood, known officially as Order of our Lady of Mercy.

MER DE GLACE, *mair de glas*, the name of the most celebrated glacier of the Alps. It is situated on the northern slope of Mount Blanc and has an area of sixteen square miles and a length of about nine miles. The lower end is known as the Glacier des Blois, whence it flows into the Arveyron River, in the valley of Chamonix. This glacier is easily ac-

cessible from the village of Chamonix, and consequently is visited by a large number of tourists each season. During the summer and autumn its flow has an average of almost three feet a day. See GLACIERS.

MER'EDITH, GEORGE (1828-1909), an English poet and novelist, one of the great figures of the Victorian Period. He was born in Hampshire and was educated in Germany. After studying law for a time, he turned to literature, and his first venture was a volume of poems, published in 1851. His first novel, *The Ordeal of Richard Feverel*, was published in 1859, and from that date poems and novels appeared steadily, although not rapidly. Among the works which place Meredith among the foremost novelists of the late nineteenth century are *Rhoda Fleming*, *The Adventures of Harry Richmond*, *The Egoist*, *Diana of the Crossways*, and *The Amazing Marriage*. He was a writer of great intellectual power, but too much given to psychological analysis to appeal to the popular taste. Reflective readers, however, find him very stimulating.

MERGAN'SER, a family of fishing ducks with slender, straight bills, hooked at the tip and notched at the edges. The *hooded merganser* is suitable for food, but the flesh of most of the others is strong, because of their fondness for eating fish. The *red-breasted merganser* is about two feet long and has no crest. Together with the hooded merganser it is found in nearly all parts of the northern hemisphere.

MERIDA, *ma're dah*, MEXICO, the capital of Yucatan, twenty-six miles from the port of Progreso, on the Mexican Gulf. It has a Moorish aspect and contains a number of fine squares, a cathedral, a bishop's palace, a government house and good legislative buildings. From Merida is shipped more sisal hemp than from any other city in the world. Most of it goes to the United States. See SISAL. Population, 1930, 110,183.

MERIDEN, CONN., a city in New Haven County, halfway between New Haven and Hartford, on two lines of the New York, New Haven & Hartford railroad. It has a picturesque location in an agricultural district, not far from lake Merimere. There are extensive manufacturers of silver and plated ware, for which the city is most famous, and hardware, cutlery, and machinery. The city contains the Curtis Library, Connecticut School for Boys, Curtis Home for Orphan

Children and Aged Women and Meriden Hospital. Previous to its incorporation in 1806, it was a part of Wallingford. It was chartered as a city in 1867. Population, 1920, 29,867; in 1930, 38,481, a gain of 28.8 per cent.

MERID'IAN, one of the innumerable imaginary lines passing from pole to pole perpendicular to the equator, on the surface of the earth. They serve to determine the longitude of places and thus to mark their exact position. Every place on the globe has its meridian, and when the sun is above this line it is noon, or midday. The longitude of a place is its distance—usually stated in degrees, minutes and seconds—east or west of any meridian selected as a starting point, just as its latitude is its distance north or south of the equator. At a national conference held at Washington, October, 1884, Greenwich was selected as the geographical and astronomical reference meridian of the world, longitude to be reckoned east and west from this, up to 180°. See LONGITUDE; LONGITUDE AND TIME.

MERIDIAN, MISS., the county seat of Lauderdale County, 85 miles east of Jackson, on the Mobile & Ohio, Illinois Central, the Alabama Great Southern, the Meridian & Bigbee River, the Gulf, Mobile & Northern, the Southern and the New Orleans & North-eastern railroads. The city is in a cotton-growing region. It contains railroad shops, cotton, cottonseed oil and lumber mills, shirt and hosiery factories and fertilizer works. Here is located the East Mississippi State Hospital, and there is a library. The government is on the mayor and council plan. Population, 1930, 31,954.

MERIMEE, *mare ma'* PROSPER (1803-1870), a French novelist, dramatist and historian, best known as the author of *Carmen*, a romance which was the origin of Bizet's popular opera. He filled, in succession, various positions under the French government, was elected to the French Academy and was made commander of the Legion of Honor. Several reports of his researches as inspector of ancient monuments were among his early publications; he also wrote, besides *Carmen*, a standard work on archaeology, several volumes of short stories, the novel *Colomba* and other books of lesser note. See CARMEN.

MERLIN, *mur'lin*, a legendary character who appears in Malory's and Tennyson's stories of King Arthur. Merlin was believed

to be a bard of miraculous powers, whose father was a fierce demon and his mother a Welsh princess. During the battles between the Britons and invading Saxons he predicted in song the history of Britain down to the twelfth century.

MERMAID AND MERMAN, in legend, creatures who lived in the sea, possessed human bodies united to the tails of fishes and were supposed to be capable of entering into social relationships with men and women. The typical mermaid was a lovely creature who combed her long, beautiful hair with one hand while she held a looking-glass with the other. The origin of this myth is supposed to rest in the humanlike appearance of certain aquatic animals, such as the seal. The legends of mermaids and mermen have been largely treated in poetry.

MEROVINGIANS, *mer o vin'je anz*, the name given to the first dynasty of Frankish kings who ruled in Gaul. The grandfather of Clovis, Merovaeus, is supposed to have given his name to the line. Clovis, the first powerful king of the dynasty, was succeeded by weaker kings, and the royal power came in time to be a name only, the real authority being possessed by the mayors of the palace. Childeric III was deposed in 751 by Pippin the Short, who was the founder of the Carolingian dynasty. See CAROLINGIANS.

MERRIMAC, *mer'imak*, THE. See MONITOR and MERRIMAC.

MERRIMAC RIVER, a river in New Hampshire and Massachusetts. It rises in the White Mountains, flows south, then east, and empties into the Atlantic near Newburyport, Mass. The immense water power furnished by its falls is responsible for the prosperity of Lowell and Lawrence, Mass., and of Nashua and Manchester, N. H. The Merrimac is about 100 miles in length, and is navigable seventeen miles from its mouth.

MERSEY, *mer'si*, a river whose broad estuary forms the harbor of Liverpool, England. It rises in the northern part of Derbyshire, flows in a general southwesterly direction and enters the Irish Sea through an estuary nearly eighteen miles in length. The river itself is seventy miles long. At Eastman Locks the Mersey is joined by the Manchester Ship Canal (see MANCHESTER).

MERTHYR-TYDFIL, *mur'thur tid'vil*, a city of Wales, situated twenty-two miles northwest of Cardiff. It is the center of the

iron and steel industry of Southern Wales and also has the largest coal mining interest in Wales. Population, 1931, 71,108.

MERV, *merf*, an oasis in Central Asia, forming the chief populated region of the Turkoman Soviet Republic called Turkmenistan. The oasis is about 2,000 square miles in area, and is very fertile, producing millet, barley, wheat and rye. Carpets of superior quality are the chief manufactures. About 120,000 persons dwell on the oasis.

MESA, *ma'sah*, the name of a small plateau, usually having a flat surface and very steep slopes. The word is the Spanish name for *table*. Mesas are numerous in the southwestern portion of the United States and were formed by erosion (see EROSION). The top of the mesas indicates the former height of the plateau, which is from 200 to 500 feet above the surrounding country. Some of the mesas are covered with vegetation, but most of them are barren. Some of those in Arizona were formerly inhabited by cliff dwellers and contain ruins which are of much interest. Some of them, as Mesa Encantada, or Enchanted Mesa, are regarded by the Indians with superstition. See CLIFF DWELLERS.

MESMERISM, *mes'mer iz'm*, the term applied to a process originated by Dr. Friedrich Mesmer (see below). He at first professed to cure diseases by stroking his patients with magnets, but later he abandoned their use and declared that his operations were conducted solely by means of the magnetism peculiar to animal bodies; hence, this influence exerted by one person over another is sometimes known as *animal magnetism*. His patients experienced convulsions, hysterics, exhaustion, trance states, etc. Scientists who investigated his "cures" decided that the effects were caused by stimulated imagination, and from the interest excited in the subject arose the process known as hypnotism. This is explained under its title.

Friedrich Anton Mesmer (1733-1815), was born at Weil, Austria. After taking a degree in medicine at Vienna, he began to practice, and was soon absorbed in his theories of magnetism. In 1778 he removed to Paris, where the most intense excitement was aroused by his practices. The French government appointed a commission to investigate his work, and among its members was Benjamin Franklin. Eventually Mesmer was denounced as an impostor, and he lost many of his followers. He died in Switzerland.

MESOPOTAMIA, a name given by the Greeks to an extensive region enclosed by the Tigris and Euphrates rivers, anciently associated with the Assyrian and Babylonian monarchies. At different times it belonged to Assyria, Babylonia, Persia, Greece, Rome and Arabia. It eventually became a part of Turkey in Asia, and is inhabited chiefly by Arabs, Kurds and Armenians. After the World War, the British forces having occupied a large part of the region, Great Britain was given the mandate to govern it. A national movement resulted in the organization of the Kingdom of Iraq, with King Feisal as monarch. In December, 1927, Iraq was granted independence, and in 1932 the new state joined the League of Nations. See **IRAQ**.

MESOZOIC ERA, *mes o zo'ik*, that division of geologic time extending from the Paleozoic to the Cenozoic Era and including the Triassic, Jurassic and Cretaceous systems. See **PALEOZOIC ERA**; **CENOZOIC ERA**; **GEOLOGY**, and the systems named.

MESQUITE, *mes ke'tay*, a small tree or shrub allied to the acacia. It is common in Mexico, Texas and other parts of the southwest of North America, where in dry regions it often appears as about the only conspicuous form of vegetation. It yields a gum resembling gum arabic, but much inferior. Its seeds are sometimes eaten, and from the mucilage of its pods a drink is made.

MESSE'NIA, a country of ancient Greece, in the southern part of the Peloponnesus. It is celebrated for the long struggle of its inhabitants with the Spartans, with whom they waged three wars between the eighth and fourth centuries B. C. In 369 B. C. the Spartan yoke was finally shaken off, and Messenia was independent until the Roman conquest in 146 B. C. Messenia is a province in modern Greece.

MESSIAH, meaning *anointed*, is a term applied in the Old Testament to the priests, to the kings and even to Gentile kings, as persons who had been anointed with holy oil. Its special application in the prophetic books of the Old Testament was to an ideal holy king and deliverer, whose advent they foretold. The whole of the prophetic pictures agreed in placing Jehovah in the central place of the desired kingship. These Messianic prophecies had, at the time of Christ, come to be applied by the Jews to a temporal king who should free them from foreign oppression. They are affirmed by Jesus Christ

and His apostles to apply to and be fulfilled in Him; and this is the belief of the Christian church, by which He is called "The Messiah." The rationalistic school of theologians asserts that Jesus laid claim to the dignity, either to meet the preconceptions of his countrymen or because He felt that the truth which He taught was the real kingdom which God was to set up, never to be destroyed.

MESSINA, *mes se'nah*, **SICILY**, the chief commercial city and seaport of the island, and capital of the province of the same name, is situated on the Strait of Messina, about 200 miles south-southeast of Naples. The harbor is one of the best on the Mediterranean, and the city is of modern aspect, having been rebuilt after the destructive earthquake of 1908. The manufactures consist chiefly of silk goods. The principal exports are silks, linen, coral ornaments, olive oil, oranges, lemons and other fruit, wine, salted fish and fruit essences. Messina possesses a university founded in 1548 and a public library of over 56,000 volumes. The town was founded presumably in the eighth century B. C., but its authentic history begins only with the fifth century B. C. During the Middle Ages it was in the possession of various nations. In 1861 it became a part of Italy. Population, 1931, 182,508.

MESSINA, **STRAIT OF**, the channel which separates Sicily from Italy and connects the Ionian Sea with the Tyrrhenian Sea. It is about twenty-four miles in length, about twelve miles across at its broadest part and two miles at its narrowest. As the strait is very deep and the tidal current very strong, navigation is somewhat difficult. It was in the Strait of Messina that in ancient times the two sea monsters, Scylla and Charybdis, were supposed to dwell. See **SCYLLA**.

METALLURGY, *me'tal ur ji*, a most important science dealing with the separation of metals from their ores. It is not of recent origin, for it was well known to the ancients; modern men have only improved upon ancient formulas and methods.

Metals are found in three classes of ores; those in which the pure metal occurs in veins or pockets, either in grains or loose nuggets; those in which the metals occur as oxides, and those in which the metals occur as sulphides. Ores of the first class need but little treatment. This consists in crushing the rock and separating the loose metal from it. This metal is then united into larger masses by

smelting. The oxides constitute by far the largest class of ores, and it is from these that the supply of iron, lead, tin, copper and zinc is mostly obtained. Most of these ores can be reduced by smelting with a flux, as in the case of the manufacture of pig iron (see IRON). The sulphides are more difficult to treat, and some of them require several processes before the metal is obtained.

In general, the treatment of this class of ores is as follows: The ore is crushed, and the metal-bearing portion is separated by running the crushed ore over vibrating tables, over which water is running. The particles containing the metal, being heavier than the others, settle at the bottom and form what is known as the *concentrate*. This concentrate is dried and roasted to drive off the sulphur. The ore is then smelted; it yields an impure metal, which is purified by repeated smeltings. Copper ores containing sulphur are reduced in this manner.

Ores containing gold and silver are often treated by the *amalgamation* process. This consists in dissolving out the gold and silver with mercury. The ore is crushed in a stamp mill, in the trough of which mercury is poured. The gold and silver are obtained from the amalgam by distillation.

Low grade ores containing gold are often treated by what is known as the *cyanide process*. By this process the ore is crushed to a fine powder and subjected to treatment by a strong solution of cyanogen. This dissolves the gold or silver, while the other metals are left unchanged. The metals are then recovered from the solution by various processes. The gold is obtained by running the solution into a vat, in the bottom of which zinc shavings have been placed. The zinc collects the gold, which forms upon it in small nuggets or crystals.

Electrolysis is also extensively employed in metallurgy. By this process the ore or alloy is placed in a strong solution of the metal which it is desired to obtain and is then attached to the positive electrode, while a plate of the metal is attached to the negative electrode. When the electric current is caused to pass through the solution, it dissolves the metal from the ore and deposits it upon the plate attached to the negative electrode. This method is particularly advantageous in obtaining copper from different ores, since that metal yields so readily to electrical action. The process is the same

as that employed in electrotyping. See ELECTROTYPING.

METALS. Elementary substances have been divided by chemists into two classes, *metals* and *non-metals*, or *metalloids*, but these merge one into the other by gradations so imperceptible that it is impossible to frame a definition which will not either include some non-metallic bodies or exclude some metallic ones. Metals are opaque, having a peculiar luster, called *metallic*. They are insoluble in water; all are solid, except mercury, at ordinary temperatures; are generally fusible by heat, and are good conductors of heat and electricity. Many of the metals are also malleable, or susceptible of being beaten or rolled out into sheets or leaves, and some of them are extremely ductile, or capable of being drawn out into wires of great fineness. They are sometimes found native or pure, but more generally they are combined as ores with oxygen, sulphur and some other elements.

Fifty-two of the elementary substances are usually regarded as metals, of which the following are the most important; aluminum, antimony, barium, bismuth, cadmium, calcium, chromium, cobalt, copper, gold, iridium, iron, lead, lithium, magnesium, manganese, mercury, nickel, platinum, potassium, silver, sodium, strontium, tin, tungsten, zinc. The ancients knew of only gold, silver, copper, tin, iron and lead. Of the fifty-two, gold, silver, copper, tin, lead, zinc, platinum and iron are the most malleable; gold, which possesses the quality in the greatest degree, is capable of being beaten into leaves $\frac{1}{1000}$ of a millimeter in thickness. In the order of their ductility they are platinum, silver, iron, copper, gold, aluminum, zinc, tin, lead. Platinum wire has been made less than $\frac{1}{200}$ of a millimeter in diameter.

The majority of the useful metals are between seven and eight times as heavy as an equal bulk of water; platinum, osmium and iridium are more than twenty times as heavy; while lithium, potassium and sodium are lighter. The metals become liquid, or otherwise change their condition, at very different temperatures; platinum is hardly fusible at the highest temperature of a furnace; iron melts at a little lower temperature; silver, somewhat lower still, while potassium melts below the boiling point of water and becomes vapor at a red heat. Mercury is liquid at ordinary temperatures and freezes

only at -39° F. All the metals, without exception, combine with oxygen, sulphur, and chlorine, forming *oxides*, *sulphides* and *chlorides*, and many of them also combine with bromine, iodine and fluorine. Several of the recently discovered metals exist in exceedingly minute quantities and were detected only by spectrum analysis.

Related Articles. Each of the important metals is described in these volumes, and to these the reader is referred. See, also, Metallurgy.

METAMORPHIC, *met a mor'fik*, **ROCKS**, in geology, rocks of any age, whose original texture has been altered and rendered less or more crystalline by subterranean heat, pressure or chemical agency. See METAMORPHISM; GEOLOGY.

METAMORPHISM, *met a mawr'fiz'm*, the term used by geologists to indicate the changes in structure and composition which rocks have undergone since their formation. While metamorphism does not apply to the decomposition of rocks, it may apply to their construction from decomposed material, as in the formation of sedimentary rocks from material that has been washed down from the hills and mountains. The most marked results of metamorphism are found in the oldest rock strata which have been changed by volcanic and other forces. The following are the changes resulting from metamorphism: (1) Hardening, as in the case of sandstones and other soft sedimentary rocks; (2) change in composition and structure, as in the case of shales and slate; (3) crystallization, as in the formation of marble from common limestone. The agencies effecting these changes are heat, chemical action, moisture and pressure. Of these, heat and pressure are the most important. See GEOLOGY.

METAMORPHOSIS, *met a mawr'fo sis*, in zoölogy a term applied to those alterations in form which an animal undergoes in the process of its development from the egg to the mature individual. A typical metamorphosis is seen in the life history of the butterfly. The fertilized egg hatches into the larva, or caterpillar, which, after reaching a certain stage of maturity, shuts itself into a hard case called a chrysalis. This is the pupal stage. In this condition it remains quiescent for some time, then breaks forth from the chrysalis transformed into the imago, or perfect butterfly, which lays the egg that begins again the circle of life. While the metamorphosis of an insect is the typical

form, yet many of the higher order of animals show similar changes. Among the amphibians, for instance, the frog lays eggs which become tadpoles that in time turn to adult frogs. Similar changes may be recognized in the vegetable world. See INSECTS; CAT-ERPILLAR.

METAPHOR, *met'a for*, a figure of speech, founded on the resemblance which one object is supposed to bear, in some respect, to another, and expressed by transferring a name or epithet from an object, to which it properly belongs, to another, so that a comparison is implied, though not formally pointed out. It is in effect a simile without any word expressing comparison. Thus, "that man is a fox," is a metaphor; but "that man is like a fox," is a simile. "I am the vine, ye are the branches," is one of the strongest of metaphors. Also we say, "A man *bridles* his anger;" "Opposition *fires* courage." See SIMILE; FIGURE OF SPEECH.

METAPHYSICS, *met afiz'iks*, a term generally applied to mental science, as distinguished from physical science. Metaphysics is of a higher order than all natural sciences, for its province is the consideration of the nature and validity of general notions, such as *matter*, *space*, *time*, *motion*, *cause* and *effect* and many others that are presupposed in all scientific investigation and theory. The physical scientist, for example, assumes that we live upon a sphere which is suspended in space and upon which all phenomena are governed by the law of cause and effect. But the metaphysician is not content merely to assume the existence of space and the reality of the law of cause and effect; he *analyzes* these notions and determines their nature and value. Metaphysics is distinct from the science of psychology, for psychology deals only with the nature of the operation and laws of mental action, while metaphysics is concerned with the ultimate value of the general forms of thought peculiar to human consciousness.

ME'TEOR, a name originally given to any atmospheric phenomenon, but now more usually applied to the phenomena known as shooting stars, falling stars, fire balls or bolides, aërolites, meteorolites or meteoric stones. It is generally believed that these phenomena are all of the same nature and are due to the existence of a great number of bodies, some of them very small, revolving round the sun, which, when they happen to

pass through the earth's atmosphere, are heated by friction and become luminous. Under certain circumstances portions of these bodies reach the earth's surface, and these are known as meteorites, or meteoric stones. These stones consist of known chemical elements. They have this peculiarity, that whereas native iron is extremely rare among terrestrial minerals, it usually is present in meteorites. It is known as meteoric iron. Exceptionally large showers of meteors appear in August, from the ninth to the fourteenth day, and in November, on the thirteenth and fourteenth, every year. The November showers exhibit their greatest brilliancy every thirty-three years.

METEOROL'OGY, a comparatively-new science, which treats of conditions relating to weather and climate. The word is derived from two Greek words which mean *things in the air* and *discourse*. This science is the working tool of the "weather man." He has become so well acquainted with the apparent vagaries of the weather that what he says is entitled to respect. (This is more fully referred to in the article WEATHER BUREAU.)

The present degree of perfection of meteorological science has been reached through observations made under the auspices of the governments of many nations. In making these observations, the conditions given the greatest weight are temperature, barometric pressure and humidity. Upon temperature and barometric pressure depend the prevailing winds, which bring either fair or foul weather. The weather forecasts of a country are made known by a weather map, which appears daily. This map shows the area of low pressure and the area of high pressure, which are marked respectively *low* and *high*. The direction of the wind is indicated, as are the places where rain or snow is falling. Places of equal temperature are connected by isotherms, and those of equal pressure, by isobars. All of these points of information are indicated by the use of symbols, which are described in explanatory notes.

By comparing the map under construction with the preceding one, the forecaster learns in what direction the areas of low pressure are moving and how far they have traveled during the interval. From this comparison, from the information contained in the last reports of the stations and from his experience, he is able to predict with a fair degree of certainty the weather for the

various localities in his district for the next twenty-four or forty-eight hours.

Related Articles. Consult the following titles for additional information:

Barometer	Isobars	Weather
Climate	Isotherms	Bureau
	Storms	

ME'TER, the arrangement of words in rhythmical units, in poetry. The term is also applied to the unit of measure itself. A metrical line is divided into a number of units, called *feet*. In certain languages, particularly in Latin and Greek, the versification depends on the length of the vowels in the syllables in these feet; in English, however, as in the other Germanic and in the Romance languages, the meter depends on the number of syllables in a line and takes no account of the length of their vowels. The most common meters in English are the following:

Iambic. In this each foot consists of two syllables, an unaccented, or short, syllable, and an accented, or long syllable; as—

I can' /not sing' /the old' /en songs' ;

Trochaic. In this an accented syllable is followed by an unaccented; as—

Tell' me / not' in /mourn'ful / num'bers ;

Dactylic. In this an accented syllable is followed by two unaccented; as—

Wel'come ye /chiefs' of the /High'landers ;

Amphibrachic. In this one accented syllable comes between two unaccented; as—

Forev'er /my child'ren /remem'ber /your coun'try.

A line is designated according to the number of feet as follows: one of two feet is called *dimeter*; of three feet, *trimeter*; of four feet, *tetrameter*; of five feet, *pentameter*; of six feet, *hexameter*; of seven feet, *heptameter*.

ME'TER, the unit of length in the metric system of weights and measures. Its length is one-ten millionth of the unvarying distance from the equator to either pole, which is 39.37+inches, or 3.28+feet. This measure was adopted as France's standard of linear measure in 1799, but its use was not made obligatory until 1837. See **METRIC SYSTEM**.

METH'ANE, MARSH GAS, or FIRE DAMP, a gas which is a compound of carbon and hydrogen, produced by decaying vegetable matter under water, and therefore found in the gases which bubble up through stagnant water. It is colorless and odorless and burns with a blue flame. It is found in many coal mines and from its explosive nature has been productive of great damage.

METHODISTS, *meth'odists*, a general name applied to the members of those religious bodies which have their origin in the society founded in 1739 by John Wesley (which see). Wesley called his organization the United Society, but outsiders applied the name Methodists to its members, because of the methodical way in which they ordered their lives. As the numbers increased, other societies were formed, and Wesley subdivided them into classes, placing a leader over each class. Each leader had his circuit, and several circuits were presided over by a clergyman, while Wesley was at the head of the organization. In 1741 lay preaching was introduced, and in 1784 the denomination became independent of the Church of England, the first act securing this independence being the consecrating of two men for missions in North America. In doing this, Wesley assumed power not granted him by the Church. At the conference held in Baltimore that year, the name *Methodist Episcopal Church* was assumed. Since that time various other branches of Methodism have been founded, though the Methodist Episcopal branch is by far the strongest.

The Methodist Protestant Church grew out of a desire to have laymen admitted to the Church councils. In 1843 the Wesleyan Methodist Connection was organized by a following which was strongly opposed to slavery, and this was the beginning of a division of sentiment which led, at about the time of the Civil War, to the separation of the Church in the United States into two great divisions, the Methodist Episcopal Church, most of whose followers were opposed to slavery, and the Methodist Episcopal Church South, composed almost wholly of slaveholding members or members that were in sympathy with that institution. In 1920 definite arrangements were made for the immediate union of the Northern and Southern branches of the Church.

The Free Methodist Church was also organized in New York in 1860, and the African Methodist Church, designed particularly for colored people was organized in Philadelphia in 1816, but it did not receive any considerable membership until after the Civil War.

The chief doctrines of the Church are a belief that all men are sinners; that God the Father loves all men and hates sin; that Christ died for all men to make sure

the salvation of all who believe in Him; that the Holy Spirit is given to all men to incline them to repent and believe in Christ; that all who repent are forgiven, regenerated and adopted as children of God, and that all who persevere to the end shall be saved in Heaven forever.

The governing body of the Church in the United States is a general conference, composed of the bishops and other general Church officials, of ministerial delegates and lay delegates elected by each conference, the number being apportioned in accordance with membership. This body meets every four years and legislates concerning all lines of Church activity. It also elects the general officers, such as bishops, secretaries and editors of publications. The number of communicants is about 20,000,000, of whom about 9,000,000 are in the United States. About one-half of these belong to the main body of Methodists. A union of the Methodist Episcopal Church, the Methodist Episcopal Church South, and the Protestant Methodist churches may be completed before 1940.



METHODS OF TEACHING, plans of procedure so as to obtain results in the instruction of children. Since all learning is by mental activity of the learner, methods of teaching are founded upon the principles and laws of psychology, and the teacher should have a thorough acquaintance with these. The close relation of mind and body also make it neces-

sary that the teacher have some knowledge of the child's physical condition. She should at least understand the relation of effort to fatigue and the effect of fatigue upon the system, the plastic condition of the nervous system and the order of development of the mental powers. At school age the intelligence of children depends largely upon their home and neighborhood associations; hence, if she would be successful, the teacher must also become acquainted with the child's environment.

Presentation of Subjects. Attention is essential to learning. If the child is to acquire an idea, he must concentrate his mental powers upon it, and this requires an act of

will. But before the child wills to give his attention to an object, he must feel that a knowledge of it will satisfy some want; that is, he must have an interest in it. The teacher's success depends upon her ability to awaken this interest. In her presentation of subjects, she should be guided by a few general principles. These are:

(1) Interest is common to all children, but often needs to be directed by the teacher.

(2) Children are most easily interested in what they know something about; therefore, in selecting subjects for young children, the teacher should have due regard for what they already know. It would be difficult to interest a beginning class of a rural school in a large building or a city street which they had never seen, and it would be equally difficult to interest a similar class of a city school in a cornfield if they had never visited the country.

(3) Children are not interested in what they cannot understand; therefore, each lesson should be a preparation for the one to follow, and the grade of work should be kept well within the capacity of the pupils.

(4) Interest leads to attention, and attention requires effort and is followed by fatigue. Most lessons in primary grades should not exceed ten or fifteen minutes in length. With older pupils the time can be extended, but in all cases, when interest begins to wane the exercise should be changed.

(5) The arrangement of the lesson should be logical, so that pupils will have no difficulty in seeing the relations of the parts to each other, and the presentation should be such that the connection with the previous lesson is equally clear.

(6) The teacher's explanation should be in simple language and should contain such illustrations as will appeal to the pupil's experience. Descriptions should be clear, vivid and lifelike.

Formal Steps in Learning. The pupil must take three formal steps in every complete act of learning, namely, the formation of the individual idea or notion; the formation of the class idea, or the general notion, and the application of the general notion to individual notions or ideas. In other words, these steps are the acquisition of knowledge, the classification of knowledge and the use of knowledge.

The Individual Notion. All ideas obtained through the senses or by concrete illustrations are distinct, as the idea of a chair, a house or a good deed. They are obtained by the observation of individual objects or by the hearing of particular instances of what others have done, and they contain the qualities belonging to each of these objects or instances, respectively. Their

acquisition is the first formal step in gaining knowledge, and during the first ten years of his life, the child's mental energies are very largely occupied in acquiring individual notions.

The General Notion. Unclassified knowledge is of but little use, and the child soon begins to compare his ideas. In so doing, he discovers their resemblances and differences. If he is acquainted with a cat and unacquainted with a dog, upon his first seeing a dog he may call it a cat, because he notices that each has four legs and fails to notice the points of difference. With further observation of dogs and cats, he discovers that they have more points of difference than of resemblance, and he forms a conclusion that a dog is not a cat. He has now arranged his idea of dog and cat in two groups, each of which includes certain qualities that do not belong to the other. In a similar manner, he classifies all his other ideas. Each class idea is a general notion. Its formation requires the use of all mental powers and is much more difficult than the formation of individual notions.

A general notion includes only those qualities common to all the objects of the class to which it applies; that is, it is abstract. The notion *man* includes only those qualities common to all men, and it cannot be perceived by the senses, but as soon as the idea comes into consciousness, it is applied to an individual, and its existence is seldom noted. For these reasons general notions are not easily understood.

The teacher should assist the pupil in the formation of general notions. The first step is to see that the pupil acquires correct and well-defined individual notions; the second is to prevent the formation of conclusions without sufficient observation, and the third is to show the pupils the value and importance of a good stock of general notions. The principles and rules of arithmetic are good illustrations of general notions. From the beginning of the study of number, the teacher should lead the pupils to discover these principles and to construct the rules.

Application of the General Notion. When a new idea is received, it is compared with ideas already in the mind and classified. If a child has formed the general notion *fruit*, the first time he examines a quince he will compare it with this idea and decide that it is or is not a fruit. His conclusion will be right or wrong

according to the correctness of his general notion and the care with which he examines the object (see APPERCEPTION). This is the third formal step in the act of learning and is essential to the success of the other two. It is the measure by which they are to be judged. Use is the only true test of knowledge. Unless the pupils can apply their rules of arithmetic to the solution of real problems; unless they can apply their definitions in language to selections which they have not before seen, the teacher may be certain that their general notions are not well defined. Failure to apply general notions usually follows the memorizing of rules and definitions without first discovering them experimentally. Within the range of their capacity pupils should have a large amount of work requiring the application of the general notions which they have formed to new individual notions.

While these mental processes and formal steps have, for the purpose of treatment, been considered separately, it should be remembered that they all belong together, but that at one time the teacher should give particular attention to one, and at another time to another, as the conditions require.

Method and Devices. Careful distinction should be made between method and devices. The method is a systematic plan of teaching, based upon the laws governing mental development. A device is a scheme for assisting a pupil or a class to understand a principle or for holding the attention on a subject which of itself is not of particular interest. Blocks for teaching numbers, objects and pictures for teaching language, are devices to assist in carrying out the method selected by the teacher. Devices are useful and necessary, but they should always be chosen with care and so used as to assist in carrying out the method adopted. The danger attending their use is that they will be continued too long and will be given too much prominence.

Related Articles. Consult the following titles for additional information:

Attention	Interest
Concept	Language, Methods
Deductive Method	of Teaching
Feeling	Memory
Geography, Method of	Perception
Teaching	Psychology
Habit	Reason
Imagination	Sensation
Inductive Method	Will

METHYL ALCOHOL. See WOOD ALCOHOL.

METHYLATED, *meth'i la ted*, **SPIRIT,** or **WOOD SPIRIT,** spirit of wine, contain-

ing ten per cent of wood naphtha, which contains a large proportion of methylic alcohol. The naphtha communicates a disagreeable flavor, which renders it unfit for drinking. It is of much use in the arts and in the manufacture of paints and varnishes.

METONYMY, *me tahn'i mi*, the name given to a figure of speech in which a thing is referred to by some other name than its own. This substitution is based on some relationship between the thing which is named and the thing by which it is described. The following forms of metonymy are the best known:

(1) *The use of the container for the thing contained:*

"The bottle is the drunkard's enemy." Here the bottle is used for that which it contains—drink.

(2) *The use of the sign for the thing signified:*

"Fight for your altars and your fires." Here church and home are referred to by symbols.

(3) *The use of effect for cause:*

"Gray hairs demand our respect." Here old age, which causes gray hair, is referred to. See FIGURES OF SPEECH.

METRIC SYSTEM, a system of weights and measures based on the decimal system, whose standard of measurement is the meter. The system takes its name from this unit. The metric system was originated by the French; it was adopted by France in 1799, but its use has been obligatory there only since 1837.

American children—and men and women, too—who are accustomed to the familiar English system of feet, pounds, yards, gallons, and other measurements derived from them do not look with favor on the metric system, believing it to be of intricate design and most difficult to understand and use. This belief rests upon lack of understanding, and there is little desire to acquire a different mental attitude. The Greek and Latin terms employed as prefixes in names of metric measures appear too formidable to admit of familiarity. Once prejudice is overcome, the manifold advantages of the system become apparent.

Americans and Canadians have a decimal system of money; the dollar is the unit, and tenths and hundredths of a dollar are simple to comprehend. The French have the franc, which they also divide into hundredths; the

peso of Spanish-American countries, the lire of Italy, the milreis of Brazil and the monetary units of many other countries are on the same decimal system. This being so manifestly convenient, as Americans know by experience with their own system, it must be admitted that a like decimal system carried into all measurements must possess advantages fully as great.

Basis of the System. Let us examine the foundation of the metric system. For *measures of length, or extension*, instead of the yard, we substitute the meter. This, in a term easily understood, is 39.37+ inches, and is one ten-millionth of the distance from the equator to one of the poles of the earth. Could you go to a store and buy a meter of cloth with a clear mental view of the length of the piece you would receive? You certainly understand that.

Measures of length below the meter are easily computed on the decimal system. The Latin *centum* refers to hundredths. Referring again to familiar things, the *cent* is the hundredth part of a dollar, a *centime* the hundredths part of a franc. A *centimeter* is the hundredth part of a meter. The prefix *decem* refers to tenths, *milli* to thousandths. For measurements greater than the meter *deka* refers to ten; *hekto*, hundred; *kilo*, thousand; *myria*, ten thousand. We are now ready for a table of linear measure:

10 millimeters	= 1 centimeter
10 centimeters	= 1 decimeter
10 decimeters	= 1 meter
10 meters	= 1 dekameter
10 dekameters	= 1 hektometer
10 hektometers	= 1 kilometer
10 kilometers	= 1 myriameter

The term myriameter (10,000 meters) is seldom heard in English-speaking countries, but the kilometer became familiar to readers of war news from 1914 to 1919. A kilometer is approximately three-fifths of a mile, a measure as easy to comprehend as the term mile. If you live on a farm, how many kilometers are you from town?

Surface, or Square, Measure. As the meter is the unit of linear measure, the square meter is the unit of square measure. Any boy or girl can therefore construct

the metric table or square measure. For ordinary measurements, instead of the term *one hundred square meters* the word *are* is used, and for *one hundred ares* the term *hektare* (10,000 square meters) is employed. When measuring very large areas, however, such as a state or province, the term *square kilometers* prevails.

Cubic Measure, or Measure of Volume. The unit is the cubic meter, that is, a solid each of whose edges is a meter in length. The table of cubic measure is easily constructed. Sometimes, as in measuring wood, the cubic meter is called a *stere* (pronounced *stair*).

Liquid Measure. The unit, instead of the familiar quart, is the *liter*. Technically it is a cubic decimeter of distilled water at its greatest density, which is at a temperature of 39.2° F at sea level. It is equal to 1.056 quarts, or about one and one-twentieth quarts. Forget the word quart and center the mind upon its metric equivalent; the following table then can easily be understood:

10 milliliters	= 1 centiliter
10 centiliters	= 1 deciliter
10 deciliters	= 1 liter
10 liters	= 1 dekaliter
10 dekaliters	= 1 hektoliter
10 hektoliters	= 1 kiloliter
10 kiloliters	= 1 myrialiter

The Unit of Weight. The unit of weight is the *gram*. It is the weight of one cubic centimeter of distilled water at its greatest density, which is at a temperature of 39.2° F., at sea level. The English equivalent of the gram is 15.432 grains. The table for measures of weight follows:

10 milligrams	= 1 centigram
10 centigrams	= 1 decigram
10 decigrams	= 1 gram
10 grams	= 1 dekagram
10 dekagrams	= 1 hektogram
10 hektograms	= 1 kilogram
10 kilograms	= 1 myriagram
10 myriagrams	= 1 quintal
10 quintals	= 1 tonneau

Table of Equivalents. For comparison of the principal weights and measures used in Canada and the United States with those of the metric system, the double table below is of value:

Metric System		English Measurements	
		LENGTH	
Meter	= 1.093 yards	Yard	= 0.9144 meter
	= 3.281 feet	Foot	= 0.3048 meter
	= 39.370 inches	Inch	= 0.0254 meter
Kilometer	= 0.621 mile	Mile	= 1.609 kilometer

Square Meter = 1.196 square yards
 = 10.764 square feet
 Square centimeter = 0.155 square inch
 Square kilometer = 0.386 square miles
 Hektare = 2.471 acres

Cubic Meter = 1.308 cubic yard
 = 35.314 cubic feet
 Cubic centimeter = 0.061 cubic inch
 Stere = 0.275 cord

Liter = 1.056 U. S. liquid quart or
 [0.878 English liquid quart]
 = 0.908 dry quart
 = 0.264 U. S. gallon or
 [0.220 English gallon]
 Hektoliter = 2.837 U. S. bushels or
 [2.75 English bushels]

Gram = 15.432 grains
 = 0.032 troy ounce
 = 0.352 avoirdupois ounce
 Kilogram = 2.2046 pounds avoirdupois
 Tonneau = 2204.62 pounds avoirdupois
 Carat = 3.08 grains avoirdupois

Extent of Use. The metric system, in whole or in part, is by law used in forty-three countries of the world. In the United States, Canada, Australia and Great Britain its use is permitted by law, but is not obligatory. Business houses in any of these countries which ship goods to countries using the metric system must employ it in all such transactions. Therefore if a young man enters an exporting house he must become thoroughly familiar with it.

There have been attempts to establish this decimal system of weights and measures as the only lawful one for the United States, but little encouragement has been given. The first effort was made by Thomas Jefferson in 1790; the second, by John Quincy Adams in 1821. Later several men less notable have proposed such a law.

Related Articles. Consult the following titles for additional information:

Arithmetic Kilometer
 Gram Meter
 Kilogram Weights and Measures

METRONOME, an instrument consisting of a weighted pendulum moving on a pivot and set in motion by clockwork. Its purpose is to mark, by its vibrations, the quickness or slowness with which musical compositions are to be executed. There is a sliding weight attached to the pendulum rod, by the shifting of which the vibrations may be made slower or quicker, an accompanying scale indicating the number of audible beats per minute. This device is helpful in practice work, for it enables the student to play in exact time.

SURFACE

Square yard = 0.836 square meter
 Square foot = 0.092 square meter
 Square inch = 6.45 square centimeters
 Square mile = 2.590 square kilometers
 Acre = 0.405 hektare

VOLUME

Cubic yard = 0.764 cubic meter
 Cubic foot = 0.028 cubic meter
 Cubic inch = 16.387 cubic centimeters
 Cord = 3.624 steres

CAPACITY

U. S. liquid quart = 0.946 liter

Dry quart = 1.111 liter
 U. S. gallon = 3.785 liters
 [English gallon = 4.543 liters]
 U. S. bushels = 0.352 hektoliters
 [English bushels = 0.363 hektoliters]

WEIGHT

Grain = 0.0648 gram
 Troy ounce = 31.103 grams
 Avoirdupois ounce = 28.35 grams
 Pound = 0.4536 kilogram
 Short ton = 0.907 tonneau

METROPOLITAN MUSEUM OF ART, the leading institution of its kind in the United States, located in New York City, on the Fifth Avenue side of Central Park. Art treasures of priceless value are housed in a beautiful building, for which the New York legislature made the original appropriation of \$500,000. The first section was completed in 1879, and in 1902 the central portion, designed by Richard Morris Hunt, was completed at a cost of \$1,200,000, paid by the city. Other costly additions were subsequently made, and the total value of the structure is now estimated at about \$20,000,000. The art treasures form one of the world's great collections. They include representative paintings of the European and American masters, antiquities, sculpture, rare vases and specimens of ancient glassware, pottery, medieval armor, jewelry and musical instruments. The museum has been enriched by many generous bequests, including the Benjamin Altman collection, and George Gray Barnard's collection of medieval sculptures. Among the prized possessions of the museum is a Raphael Madonna, the *Colonna*, donated by J. P. Morgan.

METTERNICH, *met'tur niK*, CLEMENS WENZEL NEPOMUK LOTHAR, Prince (1773-1859), an Austrian statesman. He represented Austria as ambassador at various European courts between 1801 and 1809. In the latter year he became minister of foreign affairs. In 1813, after the French reverses in Russia, Austria declared war against

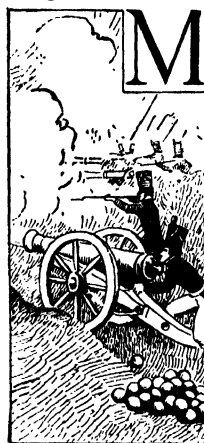
France, and from this period the policy of Austria, and in a great measure that of the other leading Continental powers, was shaped by Metternich. His policy was always reactionary and strictly opposed to the feeling of nationality which was growing up in Germany. He continued in power till, by the revolution of 1848, he was driven from office and had to flee to England, where he remained till 1851. He then returned to Vienna, but never regained his influence.

METZ, *metz*, a great fortified city in Alsace-Lorraine, triumphantly entered by the French at the close of the World War, after it had been in German hands for nearly half a century. It is situated at the confluence of the Moselle and the Seille, eighty miles northwest of Strassburg. The city consists of an older portion, with narrow streets, and a well-built newer part, which has beautiful open squares and fine buildings. Among the most noteworthy structures is the Cathedral of Saint Stephen which was begun in the thirteenth century. The manufactures comprise leather, shoes, woolens, cottons, hosiery, hats, muslin and glue. From the middle of the sixteenth century, Metz belonged until 1870 to France. On October 27, 1870, Bazaine, with the French army, surrendered here to the Germans, and the city was included in the cession of territory to Germany at the peace of 1871. Subsequently its fortifications were greatly strengthened. In the vicinity of Metz the Americans made one of the greatest drives in the fall of 1918 (see WORLD WAR). Population, 1931, 78,767.

MEUSE, *muz*, a river of Europe in the vicinity of which occurred some of the most desperate fighting of the World War. American forces were engaged in this sector when the war ended (see WORLD WAR). The Meuse rises in France, in the southern part of the department of Haute-Marne, and flows through France, Belgium and the Netherlands, and after joining the Waal flows into the North Sea. Its length is 498 miles, and it is navigable for about 355 miles. It is connected with the Moselle and the Oise by canals. On its banks are the French cities of Sedan and Verdun, and the Belgian cities of Liège and Namur.

MEYERBEER, *mi'er bayr*, GIACOMA (1791-1864), a German composer and music director, best known for his brilliant opera *Les Huguenots*. He was born at Berlin, of Jewish parentage, and displayed unusual

talent as a pianist in childhood. His preference, however, was for composing, and he began his career with operatic compositions. Unsuccessful at first, he won public favor in 1831 with *Robert le Diable*, following this in 1836 with his masterpiece, *Les Huguenots*. Both of these were presented at first in Paris, and they are decidedly French in atmosphere. In 1842 Meyerbeer was made royal music director at Berlin, holding this position until 1849, when he returned to Paris. The same year he produced in Paris another success, *Le Prophète*. His last opera, *L'Africaine*, was completed shortly before he died. The four operas mentioned were long popular, but *Les Huguenots* is the only one heard at the present time.



MEXICAN WAR, THE, the war between the United States and Mexico in the years 1846-1848. Many people have termed it a war which should never have been fought, but history justified it, aside from its primary cause. The fundamental cause was the desire of the pro-slavery party in the United States to secure additional slavery territory. This led to an early recognition of the independence of the Republic of Texas, in 1837, to the long agitation in favor of the annexation of Texas in spite of Mexico's earnest opposition, an end which was accomplished in 1845, and, finally, to a dispute over the boundary of Texas.

As a Mexican state, Texas had been bounded on the south by the Nueces River, but when admitted to the Union it claimed, and was supported by the United States in the claim, that the Rio Grande was its natural boundary. In 1845 James K. Polk became President, and his open ambition was to gain for the United States all the territory of California, Oregon, New Mexico and Texas. He therefore ordered General Taylor, who had been stationed at the Nueces River with 3,000 men, to cross that river and proceed to the Rio Grande. This was answered by a counter-advance by the Mexicans into the disputed territory. On April 23, 1846, a small body of Americans was de-

feated by a force of Mexicans. Immediately President Polk sent a message to Congress, declaring that a state of war existed "through the act of Mexico herself." Congress accepted this partial view of the matter, and on May 13 declared war.

On May 8 General Taylor met a body of about six thousand Mexicans at Palo Alto and administered a severe defeat, though his own troops numbered only about 2,000. The Mexicans fell back upon Resaca de la Palma, but were again defeated on the following day. Taylor's spring campaign ended May 18, when he occupied Matamoros. There he remained until September, when he advanced upon Monterey, which fell after a short siege, September 24. Meantime, American

troops had occupied New Mexico and upper California, and had taken possession of important territory around Chihuahua.



troops had occupied New Mexico and upper California, and had taken possession of important territory around Chihuahua.

These American successes, however, were not sufficient to lead the Mexicans to overtures of peace; consequently, in the following spring General Scott was sent to the front with a new force. He also took 10,000 men from General Taylor's army. Scott landed at Vera Cruz on March 7, 1847, and conducted a continuous bombardment until March 27, when the city surrendered. The Mexican general, Santa Anna, though formerly exiled for his failure to accomplish the subjugation of Texas, had now returned and was in supreme command of the Mexican troops. He decided to march against Taylor, whose force had been depleted. He reached

the vicinity of Monterey, February 20. Taylor retired to Buena Vista, where he inflicted a severe defeat three days later, with a loss of about 800, the Mexican loss being fully twice as many. Two months later Scott left Vera Cruz, stormed the mountain pass of Cerro Gordo and pressed on, driving the Mexicans before him, toward Puebla. There the Americans rested until August, when they moved forward about 11,000 strong. On August 19 and 20 three severe battles were fought about ten miles from the city of Mexico, at Contreras, San Antonio and Churubusco. In all, the Americans were far outnumbered, but by the greatest skill and bravery they gained decisive victories. After an armistice of about three weeks, Scott advanced to the city's gates and won a brilliant victory at Molino del Rey. On September 13 he stormed the heights of Chapultepec and on the next day entered the Mexican capital in triumph.

The war was ended by the Treaty of Guadalupe Hidalgo, which was signed February 2, 1848. A notable feature of the contest was the training which it furnished to young officers who later played conspicuous parts in the great Civil War. Among these were Stonewall Jackson, George B. McClellan, George G. Meade, U. S. Grant, Robert E. Lee and Jefferson Davis. It also resulted in the elevation of General Taylor to the Presidency in the following administration.

The Mexican War's moral effects persisted, and the Mexican people continued to dislike the powerful nation at the north. That it was widely admitted in the United States that the war never should have been fought kept indignation high in the southern republic and led to a wide misconception of the real nature of the American people. For more than eighty years antagonism continued, and it not yet fully allayed. However, the visit of the aviation hero Lindbergh to Mexico City on a good-will mission and the diplomacy of Ambassador Morrow (1928-1929) paved the way to a better understanding between the two countries.

Related Articles. Consult the following titles for additional information:

Buena Vista, Battle of	Monterrey, Battle of
Chapultepec, Battle of	Palo Alto, Battle of
Churubusco, Battle of	Polk, James Knox
Guadalupe Hidalgo, Battle of	Resaca de la Palma, Battle of
Treaty of Mexico (history)	Texas (history)



MEXICO, a republic embracing more than three-quarters of a million square miles, is the nearest southern neighbor of the United States. Though about half of the country lies in the Torrid Zone, the physical aspect of much of it is similar to the land mass of the southwestern states of the American Union. There, however, the comparison ends, for the two peoples present sharp contrasts in manner of living, trends of thought, and traditional experiences; they speak different languages, and their cultures do not blend.

Location and Area. The map of Mexico suggests very strongly the cornucopia, or horn-of-plenty, used in heraldry and architecture to signify liberality and abundance. At the southeastern tip of the horn is the peninsula of Yucatan, extending in a northerly direction into the Gulf of Mexico. Running parallel with the northwestern coast of Mexico is the fingerlike projection of California, known as Lower California. The United States and the Gulf of Mexico form the northern boundary of the republic; the Gulf, the Caribbean Sea and British Honduras are east, and the Pacific Ocean and Guatemala form the western and southern boundaries. Over 1,100 miles of the northern boundary is formed by the Rio Grande, the dividing line between Texas and Mexico. The length of the entire international boundary is 1,833 miles. Including the coast islands Mexico has an area of 767,198 square miles, nearly three times that of Texas and about one-fourth that of the United States.

The People. The population of Mexico in 1930 was 16,552,722, a gain of more than two million in ten years. The pure whites number only 2,445,000; the Indians total 4,620,000, and the people of mixed Spanish and Indian blood number more than 9,000,000. There are about 160,000 foreigners, and these are largely from the United States, Great Britain and Spain. The official language of the country is Spanish, but the Indians have never abandoned their native speech.

The portion of the population that is Spanish represents a proud race; this group

has attempted to hold in its control all political power. Even though outnumbered by the other elements of the population, they have succeeded fairly well in this design, though enlightened Indians are sharing more than formerly in control of the government. President Huerta of unpleasant memory was a man of mixed blood.

The Mexican people resent foreign intrusion; this trait has led to the cry, "Mexico for Mexicans." They resent wiles through which foreign nations, well disposed, have sought commercial favor, and this accounts in large degree for retaliatory measures in their constitution and laws against other nations, particularly the United States and Great Britain.

The peon class, comprising most of the Indians and those of mixed blood, the latter called *mestizos*, live in a condition approaching squalor. They receive a mere pittance for their labor; their homes are comfortless and unsanitary.

Cities. Mexico City, the capital, is the largest and finest city in Mexico. Here, as in many of the other large cities, one may find hotels where living conditions are tolerable or even comfortable, due to European and American influence. The most important of the other cities are Guadalajara, Puebla, San Luis Potosi, Leon, Monterey, Merida, Vera Cruz, Oaxaca, Orizaba, Morelia, Pachuca, Zacatecas, Saltillo, Aguas Calientes, Tampico, Chihuahua and Juarez.

Surface and Drainage. Mexico, roughly speaking, is composed of a large central plateau, or tableland, above which rise mountain peaks; two border ridges, the Sierra Madre Oriental on the east, and the Sierra Madre Occidental on the west, and narrow coast lands at the foot of the plateau. The principal summits which rise above the plateau are of volcanic origin. Some few of these are semi-active or dormant, but the greater number of them are extinct. The chief of these volcanoes are Orizaba, or Citlaltepetl (Star Mountain), 18,250 feet high, the loftiest point in the country; Popocatepetl (Smoky Mountain), 17,520 feet high, the most famous of Mexican volcanoes; Ixtaccihuatl (White Woman), 16,960 feet high; Nevado de Toluca, 14,950 feet; Malinche, 13,460 feet; Cofre de Perote 13,400 feet, and Jorullo, 4,330 feet. This last volcano is famous because it is said to have risen above the plain in a single night of its eruption in 1759. Most of these volcanoes are situated

near the southern border of the great plateau. The three first named are above the limit of perpetual snow, which is here almost 15,000 feet.

The total coast line of Mexico is about 6,300 miles in extent. The ports on the Atlantic side are most of them insecure, and many of them are mere roadsteads. On the western coast there is, however, a series of magnificent ports from Acapulco to Guaymas, many of which are scarcely, if at all, frequented. This is accounted for by the fact that they are separated from the industrial center of the country by lofty mountains, and transportation is therefore difficult and expensive. The largest river of Mexico is the Río Grande del Norte, which forms part of the boundary between the United States and Mexico and belongs to each country. The other rivers are for the most part insignificant, as many of them are but rapid torrents, which descend from the central plateau to the sea, overflowing at some seasons of the year and drying up at others. The lakes of Mexico are numerous, but of little importance. Some of them have no outlet. Chapala, which is mostly in Jalisco, is the largest.

Climate. Mexico lies between latitude 14° 30' and 32° 40' north and is therefore for half of its length in the Torrid Zone. The peculiar structure of the surface, however, causes the greatest diversity of climate. The Mexicans divide their climate into three zones—the hot lands, along the coast, extending to an elevation of about 3,000 feet; the temperate lands, from 3,000 to 6,000 feet above the sea level, and the cold lands, 7,000 feet or more above that level. In the first of these zones the mean annual temperature is from 78° to 82° F., and the sea-coasts are exceedingly unhealthy. In the temperate zone the temperature is from 62° to 70°, and in the cold lands, from 59° to 63° F. In many parts of the temperate and cold lands the climate is delightful.

The rainfall is exceedingly uneven. Over most of the plateau it is not more than twenty-five inches, while in some other parts of the country it is as high as 120 inches. Earthquakes are not infrequent, but they usually do little damage.

Agriculture. Mexico is a country of vast natural resources. There is a great variety of useful native trees and plants, and many others have been introduced. In the forests

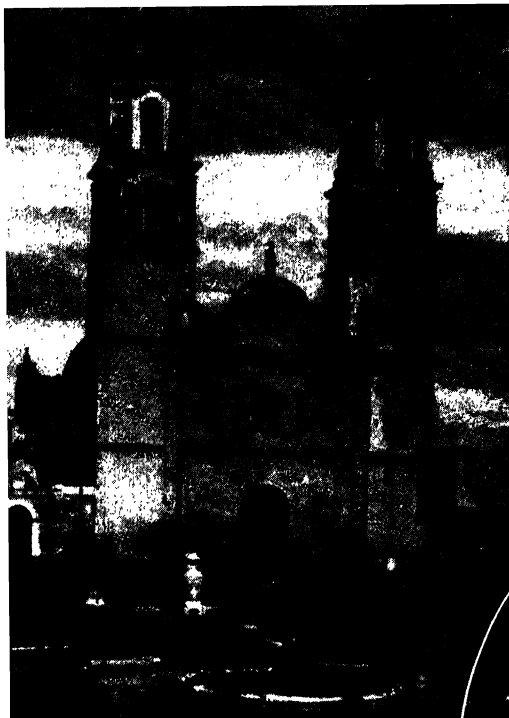
along the coasts may be found palms and acacias, rubber trees, mahogany, ebony and ironwood trees, while in the higher zones evergreen oaks, pines, firs and spruce flourish. The principal agricultural products are sugar cane, coffee, cacao, vanilla, beans, potatoes, corn, tobacco, indigo and the agave, or American aloe, some species of which are cultivated for their fibre, known as sisal hemp, and some for the juice, which, when fermented, forms the national beverage of Mexico, known as *pulque*.

In proportion to the richness of the country the average output of farming products is small. This is due to several causes, notably, need of irrigation, lower-class ignorance, primitive methods of cultivation, and unsettled conditions. The people are now much interested in irrigation; the government has completed five large irrigation projects, and nine others are planned (1934).

Stock raising is an important industry, especially in the north. The cattle are small and of rather inferior quality; the horses are small and hardy, and the sheep produce a coarse and inferior quality of wool. Much has been done, however, to improve the breeds of all of the domestic animals.

Mineral Resources. In its mineral resources Mexico is one of the richest countries in the world. When conditions are normal it leads the world in the production of silver, and although the gold-mining industry has received comparatively little attention, on account of the great expense involved, it is known that there is gold in great abundance. Lead, zinc, and copper lead in annual value, in the order named. Mexico's richest treasure from the ground is petroleum, the deposits centering in the Tampico field. The British navy was largely dependent upon this field for fuel oil during the World War. There are profitable quantities of silver (40 per cent of the world's output), arsenic, graphite, and mercury. The country has coal, but most deposits are far from transportation; its needs are supplied by Great Britain and the United States. More than 95 per cent of the mining industry of Mexico is controlled by foreign capital, principally English and American, a cause of deep unrest in the nation.

Manufactures. Though Mexico has never been a manufacturing country of great importance, considerable progress was made during the quarter century of peace previous



NEW SPAIN

can city life reflects the glory
d Spain in its cathedrals, cus-
dress, exotic patios, and color-
ful market places.

Kaufmann-Fabry; Ewing Galloway





BITS FROM OLD MEXICO

Drowsy burros and peons in sun-splashed streets; Indian mothers making tortillas; inspiring vistas of mountain and desert clothed in fantastic vegetation, are only three reasons for visiting this country.

to the revolution of 1911. After that year for nearly two decades industry was far below normal, because the country was torn by rival groups seeking political advantage and by banditry which struck savagely at exposed wealth. With the restoration of practically normal conditions, industry revived. Industrial establishments of all kinds number nearly 49,000. Of importance are such distinctive Mexican products as broad-rimmed hats, ornamented saddles, jewelry, leather articles and embroidery. The Indians are skilled in weaving, feather work and other handicrafts.

Transportation. Mexico has about 18,750 miles of railways, nearly 15,000 miles owned by the national government, the remainder by the states; there are no privately owned passenger and freight lines. Two airlines provide service between Mexico and the coast at Tampico and Tuxpan. A concrete motor road was completed in 1935 between the capital and Laredo, Tex. (770 miles); only 1,150 miles of highway in a total of 62,000 outside of cities are surfaced.

Commerce. Because of its large exports of metals and petroleum, Mexico has a favorable balance of trade; that is, it receives more money from foreign commerce than it pays out. The chief exports are named above; in addition, there may be listed sisal, coffee, valuable woods, tobacco products, and tropical fruits. The imports of the country, which are smaller in value than the exports, are largely foodstuffs, cotton and woolen manufactures, wrought iron and machinery. By far the greater part of the exports go to the United States, which furnishes more than one-half of the imports in normal years. The United Kingdom is the second in rank.

Education. In most of the states of Mexico education is free and compulsory, but as the law is poorly enforced, illiterates number 50 per cent of the people. Little has been done toward the education of the Indians, and even the foreigners, except those who are prominently engaged in trade, are uneducated. The schools are supported partly by the central government, partly by the state governments and partly as charitable institutions. Mexico City is the seat of the national university; seven other universities exist.

Government and Religion. Mexico is a Federal republic, consisting of twenty-eight states, two territories and a Federal District, in which is situated Mexico City. The re-

public has been governed under two constitutions, the first adopted in 1857, and the second in 1917. The chief executive power is vested in the President, who is elected by direct popular vote for a term of six years. There is no Vice-President. The administration is carried on under the direction of the President and a Council, by eight Secretaries of State (Foreign Affairs, Interior, Finance and Public Credit, War and Marine, Communications and Public Works, Agriculture, Education, and Commerce), and four Departments of State (Supplies, Public Accounts, statistics and Public Health).

The legislative power is vested in a Congress of two houses—a Senate and House of Representatives; the Senate consists of fifty-eight members, two from each state and two from the Federal District. Representatives are elected for three years by universal suffrage, one member for 100,000 inhabitants. Senators are returned in the same manner as Representatives, and all members of Congress receive \$3,000 a year. The Congressional session is from September 1 to December 31, and during the recess there is a permanent committee consisting of fourteen Senators and fifteen Representatives appointed by the respective houses.

The judiciary consists of a Supreme Court, with eleven judges chosen for a period of four years; nine Circuit Courts, with three judges; and District Courts, with forty-four judges. Each of the separate states has its constitution, government, judicial department and laws, as in the United States.

Roman Catholicism is the prevailing religion, but there is no state Church. All religions are tolerated, but no religious body can own landed property; all church property has been seized by the state. Protestant membership is exceedingly small.

History. Before 1521 Mexico was inhabited by the Aztecs and was ruled by native emperors. This race had attained a remarkable degree of civilization, and interesting remains of their architecture are extant in the teccallis, or pyramids, of Cholula, Puebla and Papantla. In 1521 Mexico fell into the hands of the Spaniards under Cortez. Cortez called it New Spain and was created its captain general. Many Spaniards emigrated from Spain, and in time New Spain came to include a vast territory to the north of the present Mexico. The first viceroy was appointed in 1535, and from that time for al-

most three centuries the country remained a Spanish possession. The spirit of discontent caused by the selfishness of the Spanish rule manifested itself in open rebellion, when, in 1808, the unsettled state of affairs in Spain offered an opportunity. This rebellion, begun by a priest, Hidalgo, was continued with more or less vigor, and in 1821 the independence of Mexico was assured. After an unsuccessful attempt to secure a Bourbon prince for the throne, Iturbide, the chief of the insurgents, caused himself to be proclaimed emperor, in May, 1822. In the following year, however, he was forced to abdicate, and in 1824 a constitution, modeled in part on that of the United States, was adopted and a Federal republic was proclaimed.

Since the acquisition of independence Mexico has had a most unsettled history, and has been the scene of almost incessant civil wars. A revolution in Texas in 1835 procured the independence of that territory, and eleven years later a dispute regarding the boundary of Texas led to a war with the United States. By the treaty which closed this war, New Mexico, which included part of the present Arizona and New Mexico, all of Utah and Nevada and part of Upper Colorado and Wyoming, were given up to the United States. In 1862-1863 a French army entered Mexico, and under the protection of Napoleon III, Maximilian reigned as emperor from 1864 to 1867. In 1867 the republic was again proclaimed with Juarez as president. In 1876 Porfirio Diaz overthrew Juarez and assumed the Presidency of the republic. For more than thirty-four years he ruled with such ability that the Mexican government was more stable than it had ever been before, and great material progress resulted. He maintained his authority until 1911, when Francisco Madero headed a revolution which forced the resignation and flight of Diaz from Mexico. After Madero became President, in October, 1911, Mexico was in a state of continual turmoil. Diaz was too despotic, but Madero was too indulgent. Within a few months new revolutions were in progress in various parts of the country, and Madero was overthrown, imprisoned and finally assassinated in February, 1913.

Victoriano Huerta, Madero's Minister of War, assumed control as provisional president. He attempted to secure recognition from the United States, but this was denied on the ground that he did not secure his

position by lawful means. Huerta had control of the central part of Mexico, but Madero's sympathizers, who styled themselves *Constitutionalists*, organized a strong revolution under the command of Venustiano Carranza in the north and Zapata in the south. Francisco Villa was Carranza's chief aid.

Huerta was unable to control affairs and foreign relations became intolerable. In April, 1914, members of the United States navy who landed at Tampico to purchase supplies were arrested. The insult to the United States was so flagrant that Admiral Mayo, in command of the fleet in Tampico harbor, demanded that Huerta salute the American flag as an apology. This he refused to do, and, on April 21, the American forces entered Vera Cruz, where they remained until November 23. Nineteen American marines were killed and seventy-five wounded in the capture of the city.

At this juncture the diplomatic representatives of Argentina, Brazil and Chile in Washington offered their services as mediators between the two governments. The offer was accepted and the mediators met at Niagara Falls, Ontario. They continued in session for nearly two months and finally decided that a new provisional president would be elected by representatives of Huerta and Carranza. Before this election could be brought about, however, the military success of the *Constitutionalists* compelled Huerta to resign and flee from the country.

Within a year from the downfall of Huerta the country had five different presidents. Villa revolted from Carranza and organized so strong a following against him that for a time it seemed that the army of Carranza would be destroyed. But gradually Villa's forces began to disintegrate and Carranza obtained such control over the country as to lead President Wilson to recognize his government, October 19, 1915.

During the early part of 1916 the United States and Mexico were on the verge of war. The massacre of American citizens on both sides of the international boundary by Villa bandits and the raid on Columbus, N. M., on March 8, caused President Wilson to order American troops into Mexico in pursuit of the bandits. General Pershing, with a force of 4,000 men which was later increased to over 6,000, went in pursuit of the bandits. About 100,000 of the National

Guard were mobilized and sent to the border, where they remained until December, when several regiments were ordered home. Although the United States had repeatedly called Carranza's attention to the depredations, he was either unable or unwilling to make any effort to check them. But his objection to the presence of United States troops in Mexico restricted the movements of General Pershing's forces. Neither Villa nor any considerable number of his followers were captured. Finally after mediating efforts by South American diplomats American troops were withdrawn in January, 1917.

Carranza was elected President under the new Constitution, promulgated in February, 1917. His administration was marked by irritation in the United States because of unrestricted German propaganda in Mexico. In May, 1920, a new insurrection deposed Carranza, and in his flight from the Capital he was assassinated. At the ensuing election (1920) Alvaro Obregon was elected President; he was succeeded in 1924 by Plutarco Elias Calles. Obregon was reelected in 1928, but was assassinated before taking office. Calles retained the post as Provisional President until the election of Portes Gill, in November. Calles had an ambitious program, one doomed to failure, the division of large estates among small farmers. He succeeded in destroying the influence of the Church in the government; Church and State were separated, all Church property was confiscated, and the number of priests greatly reduced and placed under strict control. Many priests were expelled, and this was the fate of the Papal delegate, in 1931. A quarrel with the United States and Great Britain over nationalization of the oil fields was compromised on fair terms after the Mexican Supreme Court had declared the proposed law to be unconstitutional. The later administrations were those of Portes Gill (1928-1930), Ortiz Rubio (1930-1932), Abelardo Rodriguez (1932-1934) and Lazaro Cardenas, whose term began in December, 1934.

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Yucatan

HISTORY

Aztec	Maximilian
Carranza, Venustiano	Mexican War
Cortez, Hernando	Montezuma
Diaz, Porfirio	Pershing, John J.
Huerta, Victoriano	Santa Anna
Iturbide, Agustin de	United States,
Juarez, Benito Pablo	subhead History
Madero, Francisco	Villa, Francisco

MEXICO, GULF OF, a large bay or gulf of the Atlantic Ocean, on the eastern coast of North America. It is oval in form and is nearly surrounded by a continuous coast line of the United States and Mexico, about 3,000 miles in length. Its tide rises between thirty and forty inches. Among the important rivers which empty into the gulf are the Mississippi, the Rio Grande, the Colorado of Texas and the Appalachian. The most important ports on the gulf are Key West, Tampa, Pensacola, Mobile, Galveston, Tampico and Vera Cruz. The Gulf Stream issues from it by the Florida Straits (see GULF STREAM) and then turns northeast.

MEXICO CITY, the capital of the republic of Mexico, and the largest Spanish-speaking city on the North American continent. Its site is picturesque and unusual, for it is built on a plateau rising from an immense valley, on the edges of which great mountains and volcanoes lift their towering peaks. It is the outgrowth of an Aztec village founded in 1325. The city is located 263 miles from the Gulf port of Vera Cruz and 290 miles from Acapulco, on the Pacific. It is distinctly Spanish in appearance, as a result of the long Spanish rule in Mexico, and has many fine streets and public squares.

The principal buildings are the cathedral, which forms one of the sides of the central square, the Plaza Mayor, and is one of the most magnificent churches in America; the national palace; the National Museum of Natural History and Antiquities, which contains a remarkable collection of Aztec relics; the national library, which contains over 200,000 volumes; the mint, and the School of Mines. Scores of churches have been closed (see GOVERNMENT, above). The manufactures include linens, silks, gold and silver ware, hats, motor cars, and soap. Most of the trade is in the hands of foreigners. Mexico City has a mild and healthful climate, and since the introduction of an improved system of drainage and sewerage, the death rate, previously very high, has decreased. There is railroad connection with most of the Mexican state capitals and ports. Population, 1931, with suburbs, 1,029,068.

MEZZOTINT, *mez'zo tint*, or *mez'o tint*, a particular manner of engraving on copper or steel, in imitation of painting in India ink, the lights and shadows being scraped and burnished out of a prepared dark ground. The surface of the plate is first completely covered with minute incisions, so that it would give in this condition a uniform black impression. The design is then drawn on the face, and the dents are erased from the parts where the lights of the piece are to be, the parts which are to represent shades being left untouched or partially scraped, according to the depth of tone. (See ENGRAVING; ETCHING).

MEZZO-RILIEVO, *mez'zo re lya'vo*, meaning *middle relief*, is the term applied in sculpture to figures that project one-half their thickness from the background. It is higher than *bas-relief* and lower than *alto-rilievo*. In *mezzo-rilievo* the figures are fully rounded, but there are no portions which are detached from the surface.

MIAMI, FLA., the county seat of Dade County, in the southeastern part of the state, 366 miles south of Jacksonville and 66 miles south of Palm Beach, on the Florida East Coast and the Seaboard Air Line railways. It is served by bus lines and maintains several airports and two dirigible fields. It is a terminal for the American Airways and a port for passenger and mail service to 20 Latin-American countries. The courthouse is 28 stories in height.

The city's manufactures include awnings, tents, batteries, cigars, clothing, food products, mattresses, rubber products and toilet preparations. Population, 1930, 110,637.

Miami, with its several suburbs, including Miami Beach, across Biscayne Bay, is a famous winter resort.

MICA, familiar to everybody in the form of windows in the firebox of coal stoves, is the name of a group of minerals composed largely of aluminum and silica, with various proportions of potassium, sodium, iron, magnesium or some other mineral. It is also incorrectly called *isinglass* (which see). The leading characteristic of the group is their formation into layers, which can be split into very thin plates, sometimes not more than $\frac{1}{1000}$ of an inch in thickness. Mica is always found surrounded by other rocks. It is separated from these and then cut into blocks, which are then split into sheets of such thickness as are desired for the various uses to which the stone is put. Sometimes plates

as large as eighteen inches in diameter can be obtained. Mica is used for windows where glass would be injured by jarring or by heat. It is also used in the manufacture of dynamo electric machines. The most extensive quarries in the United States are at Grafton, N. H. India produces about half of the world's supply, Canada and the United States the remainder.

MICA SCHIST, *shist*, white or black rock composed of mica and quartz, arranged in layers, therefore easily broken into slabs. The whitish variety gives to the White Mountains their name. Mica schist is not valuable as a building stone, except in foundations.

MICHAEL, *mi'ka el*, or *mi'kel*, SAINT, in Jewish theosophy, the greatest of the angels, one of the seven archangels, Michael, Gabriel, Raphael, Uriel, Chamuel, Jophiel and Zadkiel, which "stand before God." The first three, the principal ones, are often represented together in Christian art. In the New Testament Michael is spoken of as the guardian angel of the Church.

MICHAELMAS, *mike'el mas*, the feast of Saint Michael the Archangel. It falls on September 29 and is supposed to have been established toward the close of the fifth century. In England, Michaelmas is one of the regular periods for settling rents. The Lord Mayor of London is elected on Michaelmas day.

MICHELANGELO BUONARROTI, *me kel ahn'je lo bwaw nahr raw'te* (1475-1564), an Italian sculptor, painter, architect and poet, one of the greatest artists of all time. He was born at Caprese, in Tuscany, of the ancient family of the Counts of Canossa. He studied drawing under Domenico Ghirlandaio and sculpture under Bertoldo at Florence, and, having attracted the notice of Lorenzo de Medici, he was for several years an inmate of his household. When the Medici were sent into temporary disgrace and exile, Michelangelo, as one of their retainers, was forced to flee from Florence and took refuge in Bologna, where he remained for a few years.



MICHELANGELO

After his return to Florence, in 1501, he received from the city a commission to execute a colossal statue of *David*, and his creation was a wonderful piece of work for a young man of twenty-six. It is now one of the masterpieces of the Academy of Fine Arts at Florence. In 1505 he was induced by Pope Julius II to settle in Rome. Here he sculptured the monument of the Pontiff (including seven statues, among which was the famous one of *Moses*), now in the Church of San Pietro in Vincoli, and he painted the ceiling of the Sistine Chapel, his frescoes representing the creation and the principal events of sacred history.

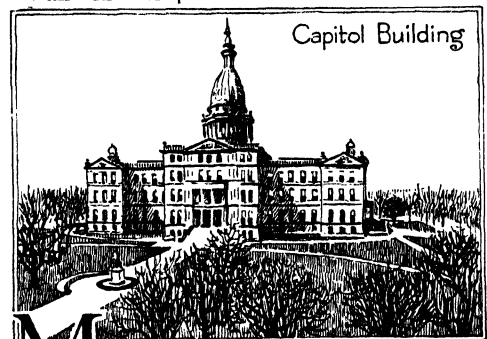
In 1530 Michaelangelo took a leading part in the defense of Florence against Charles V, being employed to build the fortifications around the city. Three years later he began his great picture in the Sistine Chapel, *The Last Judgment*, which occupied him eight years. His last considerable works in painting were two large picture, the *Conversion of Saint Paul* and *The Crucifixion of Saint Peter*, in the Pauline Chapel.

As late as 1546 he was obliged to undertake the continuation of the building of Saint Peter's, by the order of Pope Paul III, and he planned and built the dome, but he did not live long enough to see his plan finished. Many alterations were made in it after his death. The remainder of his life was devoted chiefly to architecture. He undertook the building of the Piazza del Campidoglio and the completion of the Farnese Palace, besides working on many other edifices. His style in architecture is distinguished by grandeur and boldness, and in his ornaments the untamed character of his imagination frequently appears, preferring the uncommon to the simple and elegant. His poems, which he considered merely as pastimes, contain, likewise, convincing proof of his great genius.

MICHELET, *me shlayf*, JULES (1798-1874), a French historian and miscellaneous writer, born in Paris. In 1821 he was called to the chair of history in the Collège Rollin, where he was also professor of ancient languages and of philosophy till 1826. After the revolution of 1830 he was appointed chief of the historical section of the archives of France, and in 1838 he became professor of history at the Collège de France. He lost all his offices at the political change in 1851, because he refused to take the oath of

allegiance to Napoleon III. His principal historical works are *Introduction to Universal History*, *Beginnings of French Law and History of France*, in nineteen volumes.

MICHELSON, *mi'kelson*, ALBERT ABRAHAM (1852-1931), an American physicist, the winner of the 1907 Nobel prize in physics. He was born in Germany, but emigrated early in life to the United States, and was educated at the United States Naval Academy. After his graduation, he spent several years in the navy, then resigned to pursue his studies in Europe. Upon his return he became professor of physics in the Case School of Applied Sciences, at Cleveland, Ohio. From 1889 to 1892 he was professor of physics in Clark University, after which he became head of the department of physics in the University of Chicago. Professor Michelson was known the world over for his researches and discoveries in the domain of physics. In 1927 he gave new figures for the velocity of light, then ascertained to be 186,300 miles per second. He invented the interferometer, an instrument for measuring the wave-lengths of light. Membership was accorded him in many learned societies in America and in Europe.



MICHIGAN, *mish'i gan*, a north central state, lying in the Saint Lawrence River basin. It consists of two peninsulas, the larger of which is shaped like a human hand. The southern boundary of the state is at the wrist, the tip of the middle finger is at the Strait of Mackinac, with Saginaw Bay between the thumb and fingers. Such is roughly the form of the southern peninsula. Lake Michigan is on the west and north of it, and Lake Huron, Lake Saint Clair and Lake Erie, with their connecting rivers, are north and east. Ohio and Indiana are south. The northern peninsula, the smaller section of the state, is between Lake Superior and lakes

Michigan and Huron, and for nearly half its length is north of Wisconsin.

The state as a whole is famed in several respects, and to its fair reputation both peninsulas contribute. The northern is fabulously rich in iron and copper, and it has yet vast timber tracts. The state manufactures over half of America's yearly output of automobiles, and one county (Allegan) furnishes nearly eighty per cent of the peppermint grown in the United States. Until within recent years its second city, Grand Rapids, manufactured more furniture than any other town in the world.

The area of Michigan, including about 200 small islands, is 57,980 square miles (of which 500 square miles are water). The state is over 7,000 square miles larger than England, and nearly five times as large as Belgium. The greatest length of the upper peninsula from east to west is 318 miles, and from north to south, 164 miles. The greatest length of the lower peninsula from north to south is 277 miles, and from east to west, 197 miles.

The population in 1920 was 3,668,412; by the census of 1930 it was 4,842,325, with a density of 84.2 persons to the square mile, and making it seventh among the states in number of people and thirteenth in density of population. Its largest city is fourth in rank in the United States. Popular name, Wolverine State, but often called Peninsula State; state flower, the apple blossom.

Surface and Drainage. The western section of the upper peninsula has a rough, hilly or slightly mountainous surface. It does not contain any high peaks, but is characterized by unevenness of land and a thin, rocky soil, with a low degree of fertility. It is traversed by the Porcupine and the Mineral mountains, the highest elevation being Porcupine Mountain, which is 2,023 feet in altitude. In the eastern part the northern peninsula is low, the site of an old lake bed.

The lower peninsula is generally level or undulating, the highest land being found to the southeast and northwest of Saginaw Bay. The highest point in the lower peninsula is southeast of Cadillac, where the elevation is 1,100 feet above Lake Michigan, or 1,700 feet above sea level. A mere depression, through which flow the Saginaw and the Grand rivers, extends from Saginaw Bay to Grand Haven on Lake Michigan. This is nowhere more than seventy-five feet above the level of the

lakes, and probably in former times was covered with water. The surface of the lower peninsula is dotted with small, clear lakes, most of which, in the far north, are surrounded by forests and are noted for their beauty and for abundance of fish. It is estimated that there are more than 5,000 such lakes within the state. In Oakland County alone there are about 500. Along Lake Michigan there are numerous high bluffs and sand dunes.

The rivers are all short and of comparatively small volume. The streams of the upper peninsula flowing into Lake Superior are obstructed with rapids and falls; in length and size they are comparatively unimportant. The other streams in this section are the Menominee, forming a part of the boundary between Michigan and Wisconsin, the Ontonagon, the Sturgeon and the Escanaba, which flow into Lake Michigan. The largest streams of the lower peninsula are the Raisin and the Huron, flowing into Lake Erie; the Saginaw, Au Sable, Thunder Bay and the Cheboygan, flowing into Lake Huron, and the Grand, Kalamazoo, Saint Joseph, Muskegon and Manistee, flowing into Lake Michigan.

Climate. There is a marked difference between the climate of the southern part of the lower peninsula and that of the upper peninsula. The latter is in the region of a cool-temperate climate. The summers are cool and the winters are severe, and this portion of the state is subject to heavy falls of snow.

The presence of the lakes equalizes the temperature of the lower peninsula and also exerts a marked influence on the rainfall. The southern half of the lower peninsula has a warm climate during summer and mild to cold in winter; that portion bordering on Lake Michigan and extending as far north as Grand Traverse Bay is influenced by the southwest winds which prevail throughout the year. These winds equalize the temperature of this region, so that for a distance of from five to fifty miles inland, damaging frosts in spring and fall seldom occur. Here the winters are seldom very cold nor the summers very warm, but farther inland the winters are as severe as in other parts of the state. These conditions are especially favorable to the growing of fruit, and this region constitutes the Michigan fruit belt. The average rainfall in the

state is from thirty to thirty-six inches, and it is evenly distributed through the year.

Mineral Resources. There is great diversity of mineral products, and the state is the sixth in most years in yearly production. The upper peninsula is one of the most important iron-producing regions of the world, ranking, in the amount of ore mined, second only to the Minnesota iron region, and in Keweenaw Peninsula are located great copper mines, which for many years supplied nearly all of the copper produced in the United States and only recently have been outranked by the mines in Arizona and Montana. Michigan is also the leading state in the Union in the production of salt, every year producing more than New York, the second state; the largest mines are around Manistee and Saginaw Bay. There are also large deposits of gypsum about Grand Rapids, and Michigan follows New York in the production of this mineral. Numerous lake-bed deposits of marl from which Portland cement is made rank the state fourth in cement production. There is some coal, graphite, mineral waters, building stone, etc. Clay which is excellent for brick and tile and also suitable for pottery is found.

Agriculture. Contrary to a somewhat widespread opinion that the northern peninsula consists of rocky wastes and swamps, there is to be found some of the best agricultural land in the state.

The soil and climate of the southern half of the state are remarkably well suited to the growing of nearly all crops produced in temperate climates. A region in the central part of the northern portion of this peninsula, however, contains a light, sandy soil that is not particularly well suited to tillage. The leading crops are hay, corn, oats, wheat, potatoes and sugar beets. In the production of the latter, it is the second state, following Colorado. In the fruit belt large quantities of apples of first quality, peaches, plums, cherries and small fruits are grown, the peach crop varying from 500,000 to 1,000,000 bushels a year. Dairying and the raising of live stock are also important branches of agriculture. The growing of particular crops in localities where soil is especially suited to them is a unique feature of the agriculture of this state. Particularly in the vicinity of Kalamazoo are some of the largest celery and pepper-mint farms in the country.

Manufactures. Manufacturing constitutes an important industry. Formerly the extensive pine forests in the northern part of the lower peninsula led to the establishing of numerous factories for the manufacture of lumber, doors, sash, furniture and other lumber products. Though the supply of lumber in this region has been exhausted, many of the factories are still active, and Grand Rapids is one of the largest furniture manufacturing centers in the world. In the United States it is surpassed only by New York and Chicago. The state leads in maple flooring and beech lumber.

Other manufactures include wagons and carriages, stoves, engines, machinery, agricultural implements, cars and other railroad appliances, condensed milk and grist-mill products. There are also large quantities of paper and wood pulp products, Kalamazoo being the chief center of this industry. Slaughtering, meat packing, the tanning, currying and finishing of leather and the manufacture of beet sugar are also important, and a great chemical manufactory is located in Detroit. Detroit is the largest manufacturing center because of its convenient situation for lake navigation and railway transportation.

In the above enumeration of the state's leading industries, no mention is made of automobile manufacturing. This highly centralized activity deserves more than incidental reference, because in Southeastern Michigan more motor cars are made than in any other like area in the world. More than three-fourths of the automobiles manufactured in all countries are made in the United States, and of those made here, nine-tenths are produced in the factories of Detroit, Flint, and Pontiac. Detroit stands supreme in the industry. Flint is the second city in the United States in production, for here are several subsidiaries of General Motors Corporation; Pontiac has others. Naturally reflecting the outstanding enterprise of the city, one person in every four in Detroit owns an automobile. Detroit is notable, also, as the center of a rapidly growing airplane and airplane-motor industry, early sponsored by Ford and the Packard Company.

Transportation and Commerce. An extensive coast line has given Michigan many good harbors; it has greater facilities for water transportation than any other state, and the tonnage of Michigan ships exceeds that of any other state except New York.

The southern half of the state also contains numerous trunk lines of railways, extending east and west and connecting at Detroit and Port Huron with Canadian lines. The upper portion of the lower peninsula has a number of lines extending east and west, with cross lines, so that all leading towns have railway communication. There are 2,000 miles of steam railroad in the state.

The commerce of the state is extensive. The exports consist of automobiles; lumber and its manufactured products; iron ore, salt, fruit and fish; the catching of the latter is an important industry. The imports are such manufactured articles and food products as cannot be profitably made or raised.

Government. The legislature consists of thirty-two senators, elected from districts, and a house of representatives limited to 100 members. The members of each house are elected for two years. The legislature meets biennially, and is not limited as to length of the session. The governor and lieutenant-governor are elected for two years, as are the secretary of state, the treasurer, the auditor, the attorney-general and the superintendent of public instruction.

The judicial department comprises a supreme court, consisting of eight justices, chosen by popular vote for eight years, and circuit courts, presided over by circuit judges elected for six years. Each county has a probate court, and justice courts are located in every township. The justices of the supreme court are required to reside at the capital, and the justice whose term expires first is chief justice during his last year of service.

Education. The state public schools are under the supervision of a superintendent of public instruction. The schools for each county are in direct charge of a county school commissioner, elected for four years. There are also township boards of education of three members, and each school district has a board of five trustees for graded schools and three for ungraded schools. The number of members on city boards of education is fixed by the charters of the respective cities. The support of public schools is obtained from the state fund, from local taxation and from the sale of state school lands, of which there are still large areas.

The State Normal College is located at Ypsilanti, and was the first normal school established west of New York. Normal schools devoted to the preparation of teachers for the

rural schools and for lower grades are at Kalamazoo, Mount Pleasant and Marquette. The state university, one of the best in the Union, is at Ann Arbor (see MICHIGAN, UNIVERSITY OF). The state agricultural college, located two miles east of Lansing, is under the management of the state board of agriculture, and the school of mines is at Houghton. There are also a number of colleges and secondary schools in the state maintained by religious denominations. Among these are the University of Detroit, Albion College, Adrian College, Alma College, Hillsdale College, Kalamazoo College, Olivet College, and Hope College at Holland; Ferris Institute, one of the best of the nation's private schools, is at Big Rapids.

Institutions. The state public school for dependent children is at Coldwater, the school for the deaf and dumb is at Flint, and the school for the blind is at Lansing. The asylums for the insane are at Kalamazoo, Pontiac, Traverse City and Newberry. There is a home for the feeble-minded at Lapeer, and a state soldiers' home is at Grand Rapids. The penal institutions comprise the penitentiaries at Jackson and Marquette, a house of correction at Ionia, and industrial school for boys at Lansing and an industrial home for girls at Adrian.

Cities. There were in the state in 1930 forty cities each with more than 10,000 population. Detroit, the largest city, is the fourth in size in the United States. Grand Rapids, the second city, is the forty-sixth in the Union. The eighty-three counties do not contain many large cities, but the towns are progressive, modern in public utilities, well-governed and prosperous.

History. French Jesuit missionaries and traders had visited Michigan as early as 1610, but the first permanent settlement was founded at Sault Sainte Marie by Marquette and others in 1668. Numerous villages were soon established, and Detroit was founded in 1701. The territory made little progress under French occupation, and in 1763 passed to the English by the Treaty of Paris. During Pontiac's War the garrison at Mackinac was massacred, and Detroit was besieged for over five months, but without success. In 1774 the territory was annexed to Quebec, but by the Treaty of Paris in 1783 it passed to the United States. Thereafter for several years the Indians were restless, and they were not finally subdued until 1795.

Items of Interest on Michigan

The upper peninsula is a land of mining, lumbering, hunting and summer outings; the lower peninsula is an agricultural and industrial region.

The presence of the Great Lakes, especially when the wind is on-shore, tends to temper the climate of the shore regions; in the summer the water is cooler than the land, and in the winter, because the lowest possible temperature is about thirty-two degrees, it is generally warmer.

Though Michigan produces only one comparatively unimportant crop greater than that of any other state, the mild climate of the lower peninsula enables the farmers to raise a variety of products; no state except California seems more favorably situated for fruit-raising.

Michigan produces nearly 28,000,000 quarts of strawberries, blackberries, raspberries, peaches, pears, plums, and cherries.

About 120,000,000 pounds of grapes, and 12,000,000 bushels of apples are raised in best years.

Michigan produces nearly \$10,00,000 worth of beans each year.

Michigan's mines yield about three-fifths as much as the farms; this product is nearly evenly divided between copper and iron.

The copper is mined almost exclusively in the Keweenaw Peninsula in Upper Michigan; the richest and probably most famous of these mines is the Calumet and Hecla. Michigan stands third among the copper-producing states, produces one-sixth of the world's annual output. Not long ago Michigan led all states and alone produced one-tenth of all the iron mined in the world; to-day it stands second to Minnesota, whose production has multiplied six times while that of Michigan has only doubled. It should be borne in mind, however, that the Michigan ores are of higher grade and more valuable than those of Minnesota.

The cement industry of Michigan ranks fourth among the states of the Union.

Michigan ranks second in the production

of gypsum. It also produces about 2,850,000 tons of coal and coke each year.

The Michigan fisheries yield a greater value of fresh-water fish than any other state.

The manufactures of Michigan deserve considerable attention, first, because they are largely dependent on native resources of lumber and minerals, second, because they are well distributed throughout the state and diversified everywhere: for example, the four chief industries of Detroit—lumber, iron, chemicals, and vehicles—account for less than a quarter of the manufactured output of the city, yet Detroit alone produces one-third of all the automobiles made in the United States.

There are more thoroughly competent automobile experts in Southeastern Michigan, in Detroit, Flint and other cities, than in any other like area in the world.

Three-fourths of all the peppermint grown in the United States is supplied by Southwestern Michigan.

There are thousands of small lakes in the state. Over 500 of them are in Oakland County.

The normal school at Ypsilanti was the first in the middle west.

Questions on Michigan

What is the character of the rivers of the state?

How many miles of railroad are there in Michigan?

What was the population of Michigan in 1917?

How does the soil of Northern Michigan compare with that of Southern Michigan?

What effect has the presence of the Great Lakes on the climate?

How does Michigan rank as a producer of sugar beet? Peppermint?

How does Michigan rank as a producer of copper? Of iron? Of cement? Of salt?

What are the leading manufacturing industries of the state? Of the following cities: Detroit, Flint, Port Huron, Grand Rapids, Battle Creek, Kalamazoo?

Michigan was for a time a part of the territory of Ohio and of Indiana, but was made a separate territory in June, 1805, with William Hull as governor. It was the scene of important operations during the War of 1812 (which see, for particulars). A dispute with Ohio concerning a strip of land along the southern boundary of the state led to what is known as the "Toledo War," as a result of which Michigan acquired the upper peninsula and relinquished the disputed land. On January 26, 1837, it was admitted as a state. Ten years later the capital was removed from Detroit to Lansing. The Republican party was first organized at Jackson in 1854. The upper peninsula, with its copper mines and other mineral resources and its valuable timber, had much to do with the rapid progress of the state, which has been aided, too, by the development of the motor industry in Detroit and nearby cities. A banking crisis in that city in 1932-1933 led to the national bank moratorium instituted at the beginning of President Roosevelt's first term, in March, 1933.

Related Articles. Consult the following titles for additional information:

CITIES

Alpena	Holland	Muskegon
Ann Arbor	Ironwood	Owosso
Battle Creek	Ishpeming	Pontiac
Bay City	Jackson	Port Huron
Benton Harbor	Kalamazoo	Saginaw
Detroit	Lansing	Sault Ste.
Flint	Manistee	Marie
Grand Rapids	Marquette	Traverse City
Hancock	Menominee	

GEOGRAPHY

Dune	Mackinac Island
Erie, Lake	Michigan, Lake
Great Lakes, The	Saint Clair, Lake
Huron, Lake	Superior, Lake

MISCELLANEOUS

Celery	Iron
Copper	Peppermint

HISTORY

Cadillac, Antoine de la Mothe	Pontiac (Indian chieftain)
Cass, Lewis	Raisin River,
Custer, George A.	Massacre of
Marquette, Jacques	War of 1812
Northwest Territory	

MICHIGAN, LAKE, the only one of the chain of the Great Lakes, so called, which is entirely within the United States. For nearly its entire length it lies between the states of Michigan and Wisconsin; in its northern reaches it separates the two peninsulas of Michigan. It is third in size of the Great Lakes, its area being 22,450 square miles—nearly twice that of the state of Maryland. Lakes Superior and Huron are larger.

This lake is 350 miles long, and it has an average width of sixty miles. Its surface is

581 feet above sea level, twenty-one feet lower than that of Lake Superior, and it reaches 289 feet below sea level. Its greatest depth, therefore, is 870 feet. The natural outlet is through the Strait of Mackinac into Lake Huron, but since the completion of the Chicago Drainage Canal the waters of Lake Michigan have turned the course of the Chicago River backward, with the result that a large volume of Lake water reaches the Gulf of Mexico through the Illinois and Mississippi rivers. The above-named canal is the connecting link between the Chicago and Illinois rivers.

Commerce on the lake is extensive. All the large cities on its shores have boat connection with Chicago and Milwaukee; regular steamship lines run from Chicago to Duluth, and these carry to the Chicago field millions of tons of iron ore annually. See GREAT LAKES, for diagram.

MICHIGAN, UNIVERSITY OF, a state university established at Ann Arbor in 1837, by act of the legislature, and opened in 1841. It was the first state university to attain the standard now generally accepted for state-supported universities, and one of the first to adopt coeducation (1870). Only the college of literature, science and the arts was opened in 1841. In 1850 the medical school started its first session. As organized at present, the university maintains the following colleges and schools: colleges of literature, science and the arts, engineering pharmacy, and architecture; schools of medicine, law, dentistry, graduate studies, education, business administration, forestry and conservation, and music; and the university hospital school of nursing. Other major activities include the summer session, the extension division, division of hygiene and public health, board of physical education, department of military science and tactics, libraries containing over 926,000 volumes, and the university museums.

The first mill-tax law, passed in 1867, provided for a permanent system of support for the university. In recent years the enrollment has been between 12,000 and 15,000. The combined membership of the faculties is over 700. The land, buildings and equipment of the university are valued at more than \$44,000,000, and other resources include endowment funds of \$6,612,000.

MICHIGAN CITY, IND., in Laporte County, on Lake Michigan, fifty-six miles

east of Chicago, on the Pere Marquette, the Michigan Central, the Monon, the Nickel Plate, and the Pere Marquette railroads. There is an airport. There is an extensive trade in agricultural products. The manufactures include railroad cars, chairs, men's hats, glass, hosiery, knit goods, lumber and lumber products. The Northern Indiana State Prison is located here, also a United States life-saving station. There are large, interesting sand dunes along the lake shore. The place was founded in 1832 and was incorporated in 1837. Population, 1920, 19,457; in 1930, 26,735. The city is governed by mayor and council.

MICROBE. See BACTERIA AND BACTERIOLOGY.

MICROMETER, an instrument used with a telescope or microscope for measuring very small distances. There are several patterns; the one in most common use consists of a circle divided into squares by cobweb threads. The number of squares covered by the object enables the observer to determine its size. Micrometers on surveyors' instruments usually measure distances by means of a screw with a very fine thread. The turning of the screw moves a plate, and the distance moved is known by the number of turns given the screw.

MICRONESIA, *mi kro ne'shi a*, meaning *small islands*, a name applied to one of the divisions of Oceania, the others being Polynesia, Melanesia and Australasia. The islands of Micronesia include chiefly those lying north of the equator between the 180th meridian and the Philippines. In this group are the Marshall, the Caroline and the Ladrone (or Marianne) islands, all of which were a part of the German Empire at the outbreak of the World War, in 1914. Early in the war they were occupied by Japanese forces; at the peace conference in 1919 the former German colonies north of the equator were consigned to the care of Japan, to be governed by that country under the mandate of the league of nations. Guam, one of the Ladrone group, belongs to the United States. See LADRONE ISLANDS.

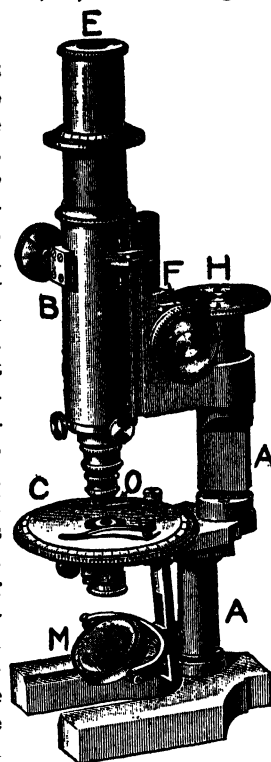
MICROSCOPE, an instrument for obtaining a highly magnified image of a very small object. The simple microscope consists of a double convex lens, which is placed between the object and the eye. It is usually known as a magnifying glass (see LENS). The compound microscope consists of a stand, A,

upon which are mounted two tubes, B, so fitted that one will slide within the other; a stage, C, which holds the object, and under which is a small mirror, M, for reflecting the light upon the object.

The tube contains the object glass O, and the eyepiece, E. The rack and pinion, F, enable the tube to be raised and lowered so as to focus the object. H is a screw having a very fine thread, which can be used when a delicate adjustment of the focus is required. If the microscope has two tubes, so arranged that it can be used with both eyes, it is called a *binocular*. The magnifying power of the microscope depends upon the power of the object glass and of the eyepiece and the distance between these lenses. The object glass forms a magnified image of the object, and the eye glass can magnify this. By extending the tube so as to increase the distance between the eye glass and the object glass, the power of the microscope is quite materially increased.

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MIDAS, in Greek and Roman mythology, a Phrygian king. One legend tells that in punishment for having decided a musical contest between Pan and Apollo in favor of Pan, he was given ass's ears by Apollo. This deformity he concealed from all except his barber, whom he compelled to swear to tell no man. The barber, however, unable to keep the secret to himself, dug a hole in the earth, into which he whispered it; soon after, reeds grew up over the spot and, as they rustled, announced to all who passed by, "King Midas has ass's ears; King Midas has ass's ears." Another story tells that Midas, having captured Silenus, the companion of Bacchus, returned him to Bacchus and as a reward was promised any gift he might ask.



COMPOUND
MICROSCOPE

Midas petitioned that he might have the gift of turning everything he touched to gold, and his request was granted. He soon found, however, that this strange ability brought with it great inconvenience, as all of his food and drink turned to solid or molten gold as soon as it touched his lips. Moved by his distress, Bacchus instructed him to bathe in a certain river, and the golden touch left him.

MIDDLE AGES, a term applied loosely to that period in European history which lies between the ancient and modern civilizations. Various dates are given for the beginning of the period: the fall of Rome, 476; the crowning of Charlemagne, 800; the death of Charlemagne, 814; the end of the Frankish Empire, 843. The period is variously conceived to have closed with the Reformation in Germany; with the discovery of America by Columbus; with the invention of printing and with the end of the Thirty Years' War in the Peace of Westphalia (1648). Most authorities, however, begin the period with the fall of Rome and end it with the discovery of America. They usually call the period between the fall of Rome and the Revival of Learning the Dark Ages (which see).

The period of something like a thousand years marked a gradual transition from semi-civilization of the masses to the light of an awakening consciousness induced by the strong influence of the Church and the spread of learning throughout Western Europe which followed the exodus of scholars from the onrushing Turks when they conquered Constantinople (1453). The common people were largely engulfed in serfdom at the time the Middle Ages were supposed to have begun. There was no learning except at the top among the classes that existed, where many brilliant men kept aloft the torch of knowledge. Few people ever left their immediate neighborhoods, and therefore could know nothing of the world beyond their doors. Feudal government prevailed, in which the masses had no part. The Crusades opened up new vistas, and the Crusaders brought back quickening influences. Mental horizons broadened and there was an urge to higher aspirations. When scholars scattered over Western Europe from the sway of the Turk, enlightenment such as had not been known hitherto began to spread, and pointed the way to the revival of learning and the Renaissance (which see).

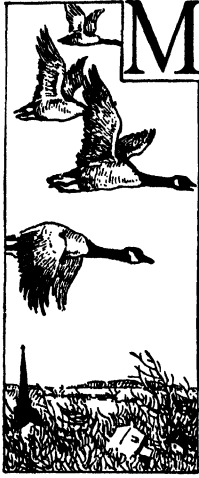
MIDDLETOWN, CONN., sixteen miles south of Hartford, is widely known because it is the home of Wesleyan University, a school founded in 1831. There is in connection with it a divinity school. The town is served by the New York, New Haven & Hartford Railroad, and is on the Connecticut River. There is some river commerce. The industries are important, over thirty different articles being manufactured in large quantities. Population, 1920, 13,638; in 1930, 24,554.

MIDDLETOWN, N. Y., in Orange County, sixty-seven miles northwest of New York City, on the Erie, the New York, Ontario & Western and the Middletown & Unionville railroads. It has a considerable trade in farm products and contains hat factories, car shops, cigar factories, glass works, a tannery and factories where automobile tires are made. The state homeopathic hospital for the insane is located here. The place was settled before the Revolution and was named from its central location, half-way between Montgomery and Mount Hope, and between the Hudson and the Delaware rivers. Population, 1920, 18,420; in 1930, 21,276.

MIDDLETOWN, OHIO, in Butler County, thirty-five miles north of Cincinnati, on the Miami River and the Miami & Erie Canal and on the Cincinnati, Hamilton & Dayton, the Cleveland, Cincinnati, Chicago & Saint Louis and the Pennsylvania railroads. There are extensive manufactures of steel, tobacco, paper, bicycles and agricultural implements. The city has an opera house and a Masonic Temple. The commission form of government is in force. Middletown was settled in 1794. Population, 1920, 23,594; in 1930, 29,992.

MID'SHIPMAN, a naval term which to-day refers to a student of the United States Naval Academy, formerly known as a naval cadet. The term has a British derivation, and once referred to young men seeking instruction on British men-of-war and who were quartered amidships, on the lower deck. See NAVAL ACADEMY.

MIGNONETTE, *min yun et'*, a flower that is cultivated almost everywhere in gardens during the summer and as a house plant in winter. Its smooth leaves are entire or divided into three parts, and the small, rather unattractive flowers are borne in clusters at the end of the stem. Its name is the French for *little darling*.



MIGRATION OF ANIMALS. Certain animals move either periodically or at irregular times and seasons from one locality to another, sometimes far distant. Occasionally migrations are caused by failure of food or some other condition which forces the animals to leave the region where they are living. The inroads which the Rocky Mountain locusts have made in the United States and the plagues of flies and other insects which

have appeared in the East have been owing to this cause. The chinch bug and the army worm are other insects that migrate in search of food and make no effort to return to their original home. This is true also of the peculiar migration of the European lemmings, small, mouselike animals which, every few years, in vast numbers leave their home in the extreme northern part of Europe and travel at night toward the south and west until they are exterminated.

Bird Migration. It is to birds, however, that we must look for the most regular and perfect example of migration. Before food supplies have failed in the warmer parts of the South, many of its birds leave for the North, sometimes traveling several thousand miles and terminating their journey with the region in which they nest. At the approach of cold weather, they return again South, where they spend the winter. In the United States this migration may be said to begin early in February, with the approach of the robin and bluebird, but it does not reach its height until toward the middle of May. The earliest birds come as soon as the weather is warm, with little attention to the season. From then on, the number of species traveling north increases steadily, growing more and more definite in point of time; in fact, the date of the arrival of the warblers and other late species is known almost to a day.

The enormous numbers of these migrating birds, the regularity of their departure and return, the long distances they cover in flight without rest, are among the marvelous things of nature. Many birds migrate openly in the

day time, but the large flocks of more timid birds fly only at night, and feed during the day in retired places. Year after year the general routes of migration are the same, following the seacoast and the great water courses until the birds reach their chosen location, when they distribute themselves in all directions. During the spring migration the male birds don their brilliant spring plumage and are easily recognized, but on their return in the fall they are duller in color and are accompanied by the females and the young, also in plumage less easily recognized, so that the fall migration never attracts as much attention as does that of the spring.

Not all species of bird are migrants; in fact, the larger number are not. Those which do migrate are confined to a few groups of high organization, who feed largely upon worms and insects, or who use them as food for their young, or who depend for food upon the wet places that are closed by frost.

MIKADO, *mi kah'doh*, the old official title of the emperor of Japan, a term yet adhered to among Western nations, but now practically obsolete in Japan. The Emperor Hirohito, who ascended the throne in 1927, is the 123rd mikado, tracing descent to Jimmu Tenno, whose reign began in 660 B. C. The Japanese imperial dynasty is supposed to be the longest unbroken line in history. Each mikado has a personal, but not a family, name, and after his death is given a special title by which he is known in history. The common people call him "Son of Heaven," and the upper classes, "Supreme Master." The popular operetta, *The Mikado*, is a burlesque on the office.

MILAN, *mil'an*, or *millan'*, ITALY, the largest city of Lombardy, the second city of the kingdom, and the capital of the province of its own name. It is situated on the small River Olona, in the middle of the plain between the Adda and the Ticino. The city is entered by a number of gates, several of which are magnificent, and the leading streets proceeding from these gates are wide, well-paved and lighted. The chief open square and the center of the life of the city is the Piazza del Duoma (Cathedral Square), in which is located the celebrated cathedral, which, after Saint Peter's at Rome, is the largest church of Europe (see below). Among the other noteworthy buildings are the Church of Sant' Ambrogio, built on the site

of a church founded by Saint Ambrose in the fourth century; the Church of Sant' Eustorgio; the Church of Santa Maria delle Grazie, in the refectory of which is the celebrated *Last Supper* of Leonardo da Vinci; the royal palace; the archiepiscopal palace; the palace of arts and sciences, with a library of 230,000 volumes and a magnificent collection of pictures, and the Ambrosian Library. The manufactures of Milan include automobiles, silks, cottons, lace, carpets, hats, earthenware, jewelry, gloves and art furniture. The city is the center of the Italian book trade, and has long been the chief financial center of North Italy.

The first distinct notice of Milan occurs in 222 B. C., when it was subdued by the Romans. In the third century A. D. it was second in rank to Rome, and at the close of that century it was made the capital of Italy by Diocletian. In the twelfth century it was the strongest of the city republics and had acquired the leadership of the other cities, and two centuries later it was made a duchy for the family of the Visconti, who gradually became supreme over almost all of Lombardy. Among the most famous rulers of the city were the Sforzas. On the extinction of the Sforza dynasty, Charles V united Milan with Spain. In the early eighteenth century it was ceded to Austria, and under Napoleon it became the capital, first of the Cisalpine Republic and then of the Napoleonic kingdom of Italy. It was restored in 1815 to Austria, from whose rule it was freed only after the Battle of Magenta in 1859. With the rest of Lombardy it was surrendered to Sardinia and became part of United Italy. Population, 1921, 718,300; 1931, 992,000.

Milan Cathedral, a famous Gothic cathedral in Milan, inferior in size to Saint Peter's at Rome, but in some respects a close rival. Its foundation was laid in 1386 by Gian Galeazzo Visconti, and many of the greatest European architects were employed in its erection. It is built of white Carrara marble, in the form of a cross, with a length of 486 feet and a breadth of 287 feet. The height of the tower is 356 feet. Numerous turrets and pinnacles and more than 6,000 statues adorn the outside. Within it Napoleon was crowned king of Italy in 1805. The view of the Alps, Lombardy and the city from the top of the cathedral is very beautiful.

MILAN DECREE, a decree issued in December, 1807, by Napoleon, and reinforced by a second one of January, 1808, to the effect that any vessel, regardless of nationality, which had been searched by an English ship, or which had paid any duty to the English government, was to be treated as an enemy vessel. This was a part of Napoleon's plan to conquer England by ruining its commerce (see **CONTINENTAL SYSTEM**). With the downfall of Napoleon's power, the entire system collapsed.

MILDEWS, the name of a number of plant diseases, caused by parasitic fungi. The term is applied also to powdery spots on cloth, paper, leather and other substances. There are two classes of mildews that attack plants, the true, or *powdery*, and the false, or *downy*, each due to fungi of different orders. The former live on the surface of flowers, stems and leaves and send minute suckers down into the tissues, thus absorbing the nourishment and often causing the death of the plant. There are about 150 species, which attack almost every kind of plant. Downy mildews form within the tissues of the host and grow outwards, appearing on the outside only to shed the spores. The spores are one-celled, are readily blown about by the wind and spread rapidly. Some of the most injurious of plant parasites are among the downy mildews. They are difficult to destroy, but spraying the affected plant with Bordeaux mixture is helpful. Dry sulphur or the fumes of boiling sulphur will check powdery mildews.

MILE, the unit of linear measure for long distances. It originated with the Romans, with whom a mile (*milliare*) was the distance of 1,000 paces of five Roman feet each. The same measure has been adopted very generally by all the world, although its length varies, and naturally different names are employed because of varying languages. The statute mile of England, the United States, Canada and Australia contains 320 rods of 16.5 feet each, or 5,280 feet. A nautical mile is the one-sixtieth part of a degree of latitude of a sphere of the size of the earth, or 6080.2 feet; a nautical mile is therefore equal to 1.151+ statute miles.

In the following table the mile of various countries, in terms used locally, is compared in length with the American mile of 5,280 feet:

English statute mile	1.
English geographical mile	1.15
French kilometer	0.621
German geographical mile	4.61
Russian verst	0.663
Dutch ure	3.458
Norwegian mile	7.021
Swedish mile	6.644
Austrian mile	4.714
Danish mile	4.682
Swiss stunde	2.987

MILES, NELSON APPLETON (1839-1925), an American soldier, born at Westminster, Mass. He entered the Federal army in 1861 and was promoted through all the grades to be major general.

After the Civil War he conducted several Indian campaigns in the west notably that against the Apaches under Geronimo in 1886. He succeeded to the full command of the United States army in 1895 and was in supreme control during the Spanish-American War. In 1900 he was raised to the rank of lieutenant-general and retired three years later. In 1905 he accepted a temporary appointment as commandant of the Massachusetts militia on the staff of the governor.



GENERAL
NELSON A. MILES

MILES CITY, MONT., county seat of Custer County, 383 miles east of Helena and 114 miles northeast of Billings, is on the Northern Pacific and the Chicago, Milwaukee, Saint Paul & Pacific railroads. The city is a horse market, is a wholesale center, and has four parks, a hospital, a convent, and an airport. Population, 1920, 7,937; in 1930, 7,175.

MILETUS, an ancient city of Ionia in Asia Minor, at the mouth of the Maeander River. It had an extensive trade, and its manufactures of woolen goods were famous. When the Ionian colonies revolted against Persia, Miletus took a prominent part and was consequently destroyed by the Persians in 494 B. C. It was restored later to a certain extent and joined Athens against Sparta in the Peloponnesian War. Saint Paul visited the city once or twice.

MILITARY ACADEMY, UNITED STATES, the national institution for the education of

officers for the United States army, established at West Point, N. Y., by act of Congress in 1802. Washington, Hamilton and others who had been officers in the American army



UNITED STATES MILITARY ACADEMY

strongly advocated the establishment of such a school immediately after the Revolutionary War, though little was done with their recommendations previous to 1802. Another act of 1808 increased the powers of the school and provided for a larger number of cadets. It is beautifully situated on the west bank of the Hudson River.

Appointments. All appointments are made by the President and as follows: six from each state at large; three from each congressional district; three from each territory; five from the District of Columbia; three from natives of Porto Rico; 172 from the United States at large, and 180 from among the enlisted men of the Regular Army and of the National Guard, the maximum strength of the Cadets being raised to a total of 1,960. Appointments from the states are made on the recommendation of Senators and Representatives; from the territories on recommendation of Delegates in Congress; from the District of Columbia and Porto Rico, on recommendation of the commissioners. From among the enlisted men of the National Guard recommendations are made by the governors of the several states; enlisted men of the Regular Army by the commanding generals of the respective corps areas. From the nation at large, graduates of educational institutions designated as "honor military schools" may be appointed upon the recommendations of the heads of such schools. The President is also authorized to appoint forty cadets at large from among the sons of officers, soldiers, sailors and marines of the Army, Navy and Marine Corps of the United States who were killed in battle or died as the result of wounds or disease contracted in the line of duty during the World War, on the fields of Europe.

Examinations and Requirements. Entrance examinations are held beginning on the first Tuesday in March each year. These are held before boards of army officers at such places as the war department may designate. Each candidate must pass the test in mental examinations and in algebra, plane geometry, English grammar and composition, English literature, and in United States and general history. Candidates are eligible for admission from the day they are 17 (or 19 if from the Regular Army or the National Guard) until the day they become 22 years of age. All candidates must be unmarried. A physical examination of each candidate begins at the conclusion of his mental test. The physical requirements are rigorous.

Course as a Cadet. When a candidate is accepted and receives his appointment, he reports at the Academy on the first week day in July and, prior to admission, is required to take the oath of allegiance and to subscribe to an engagement to serve the United States for a time subsequent to his graduation. Upon admission to the Academy, the cadet enters upon a 4-year course of study and training. The academic year extends from September 1 to June 4, the greater part of the remainder of the year being spent in Camp and devoted to military training. Each Cadet is paid \$780 per year (\$1,072, including rations).

MILITARY SCHOOLS, institutions of learning in which studies in army tactics and military science are added to the regular courses of study. To each of these schools a United States army officer is attached as an instructor. Military schools are not designed to make army officers of their students, but the special instruction given imports a morale, a physical development, a deportment and a promptness in obedience to orders that is highly desirable. The students of a military school wear uniforms prescribed by the school authorities.

MILITIA. See NATIONAL GUARD; ARMY.

MILK, a fluid secreted by the females of mammals for nourishing their young. It is produced in quantity by sheep, goats and cows, but cow's milk is the only kind used commercially in the United States and Canada. In those countries it is an important article of food in practically every household. The people of the United States alone require ten billion gallons a year, three-fourths of which they make into butter and cheese. The

average daily consumption per person is about half a pint.

What is Milk? When examined by the microscope, milk is seen to be a whitish fluid containing many minute globules of fat. These are so small that about one million of them are contained in a pint of milk. One hundred pounds of good quality cow's milk contain eighty-seven pounds of water, four pounds of fat, five pounds of milk sugar, about one and three-fourths pounds of casein and albumin and a small quantity of mineral matter. Cow's milk contains about three times as much albumin as mother's milk, and for this reason marketed milk has to be diluted when fed to babies. A milk too rich in albumin causes indigestion and summer complaint. Sugar of milk, also called *lactose*, is a sweetish substance resembling cane sugar. Mother's milk contains seven per cent of lactose, as compared with four and one-half per cent in cow's milk. The latter, when prepared for the baby, has to be sweetened as well as diluted, but the proportion of sugar should never exceed seven per cent.

The yellowish "top milk" that forms on the surface of milk left to stand is called cream (see CREAM SEPARATOR). Cream is merely milk rich in fat, for the little droplets of fat are lighter than the liquid milk and so rise to the surface. When cream is churned butter is formed. It requires five and one-half gallons of good milk to produce a gallon of cream, three and one-half gallons to make a pound of butter, and about one and one-third gallons to make a pound of cheese. *Skim milk* is the name given to milk from which the cream has been removed. It is just as wholesome as ordinary milk, the only difference being in the absence of fat. Skim milk is the cheapest form of albumin that one can purchase.

The mineral content of milk consists of lime, potash, soda, phosphates and small quantities of magnesia and iron, all of which are beneficial to the system. Besides the ingredients mentioned, milk contains a number of ferments. Some of these are in the liquid when it comes from the cow, and some develop as a result of the multiplication of bacteria. Milk sours when certain bacteria convert the milk sugar into lactic acid.

Food Value of Milk. The four main classes of food material necessary for the maintenance of health are protein, fat, carbohydrates and minerals. All of these are

found in milk, which should therefore be regarded as a food and not as a beverage. It is, in fact, a perfect food. It should not be inferred, however, that milk alone is a suitable diet for adults in normal health. It con-



New York, 674.4



Wisconsin, 5746



Iowa, 4214



Pennsylvania, 3543



Minnesota, 3519



Illinois, 3405



Ontario, 4295



Quebec, 2701

The figures represent millions of pounds, for a five year average.

MILK PRODUCTION PER YEAR

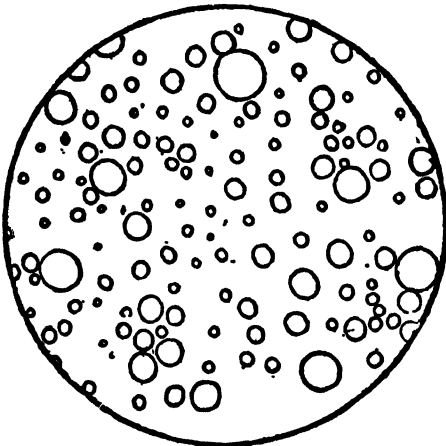
tains so much water that one would have to consume four or five quarts a day to obtain sufficient nourishment, and the system of a healthy person demands bulky food as well as liquids. Another objection is that the protein is present in rather large quantities, and milk should preferably be taken with other foods in order to keep the diet balanced.

A glass of milk is about equal in food value to two large eggs, or two slices of bread, or two medium-sized potatoes. In a

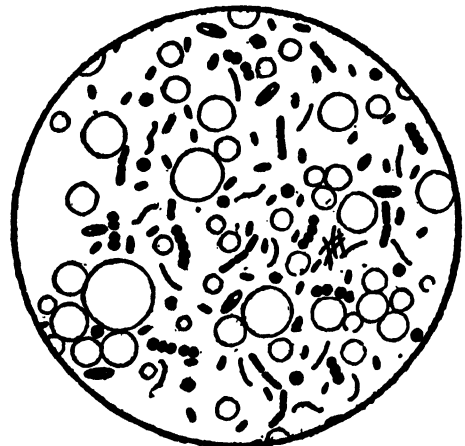
ing custards, sauces, pastry, puddings, many beverages and other foods. Its use in making cheese and butter has already been mentioned. Even sour milk is of value, for it is the foundation of cottage cheese and a European beverage called *koumis*.

Care of Milk. Milk is very sensitive to the influence of its surroundings, and from the moment it is drawn from the cow it begins to change. It absorbs odors from the stable, from vegetables, meats and cellars, and because of this the greatest care is necessary in keeping it free from all such influences. When drawn it should be immediately cooled to a temperature of 45° and kept at that temperature by being placed in cans set in cold water or packed in ice. In well conducted dairies all these points are given special attention, and proper apparatus for preserving the milk in the best possible condition is provided. The animals, the stable, the utensils and attendants of a dairy should be kept scrupulously clean; otherwise, however good the quality, the milk will reach the consumer in a tainted condition.

Milk delivered at the home should be taken in as soon as left and be placed on ice. If it is delivered early in the morning before the inmates are out of bed, the milkman



PURE MILK



INFECTED MILK

quart of milk there is as much nourishment as in two pounds of chicken, or eight eggs, or three-fourths of a pound of lean round beef. Milk is one of the cheapest foods on the market, one of the most easily digested, and one of the most nourishing. Not only is it agreeable in its natural state, but it is invaluable in cooking, being used in mak-

should be instructed to leave the bottles in a covered box. No one knows how many stray cats examine unprotected bottles left on porches. Milk conveys tuberculosis, scarlet fever, diphtheria, typhoid fever and other infectious diseases, and one cannot be too careful about keeping it always in a pure condition.

If there is any suspicion as to the quality of the milk purchased for home use, it should be sterilized; that is, heated for an hour at a temperature of 212° F. (the boiling point). Sterilized milk if kept on ice will remain sweet for several days. Heating milk to a temperature of 155° or 160° for half an hour will kill infectious disease germs, but such milk, called *pasteurized* milk, should be used the same day. The very best milk obtainable, called *certified*, is high-grade milk obtained under sanitary conditions, and inspected and endorsed by a medical milk commission. Such milk is expensive, but absolutely safe for a sick child.

Babcock Test, a method of ascertaining the amount of butter fat in milk. It is so called from the originator, S. M. Babcock, of Madison, Wis. He devised an apparatus consisting of a closed cylindrical box containing a rack to hold bottles. This is mounted in such a way that it can be rapidly whirled. The milk to be tested is poured from one receptacle into another until the butter fat is evenly distributed, and a quantity of it is then mixed with an equal quantity of sulphuric acid in a testing bottle. Milk from several different lots is similarly prepared, and then all the bottles are placed in the revolving rack. This is rotated for about five minutes at the rate of 700 to 1,200 revolutions a minute. Next a little warm water is poured into each bottle, and they are again revolved for about two minutes. If the experiment is successful all of the butter fat in each bottle rises up in the neck, which has a graduated scale showing the percentage of fat.

Related Articles. Consult the following titles for additional information:

Butter	Dairying	Milk, Con-
Carbohydrate	Fat	densed
Casein	Food	Milking Ma-
Cattle	Koumiss	chines
Cheese	Lactic Acid	

MILK, CONDENSED, fresh cow's milk preserved by partial evaporation of its water content. The process of condensing was invented by Gail Borden, an American, in 1856. There are two kinds: *plain*, or *evaporated*, condensed; *sweetened* condensed. In addition, there is condensed skim milk, usually sweetened.

Milk is condensed by boiling out part of the water. For this purpose a closed copper pan is used in which a partial vacuum is made. In this partial vacuum, the boiling point is lowered to about 140° so that the

water may be largely boiled out without giving the milk too much of a cooked taste. After the condensing is complete, the milk is placed in cans, sealed air-tight and sterilized under pressure to a temperature of 230° F. One quart of condensed milk represents about two and a half quarts of fresh milk. Condensed milk is used where fresh milk is difficult to obtain, as in mining and lumber camps and on shipboard. It is also used largely by bakers and candy makers, and the condensed skim milk by ice-cream makers, to give more body to the ice cream. A plant to manufacture condensed milk costs \$50,000 as a minimum, and is only practical where there are at least 20,000 pounds of milk available daily.

The average annual production in the United States is upwards of 220,000,000 pounds. It enjoys a considerable export trade to India, Cuba, and the Philippines. A milk powder is also obtained by evaporating milk to an extreme dryness. See DAIRYING; MILK.

MILKING MACHINE, a mechanical device for milking cows. The object of experiments in the construction of milking machines is to find an apparatus that will lessen labor and at the same time be hygienic. The most satisfactory machine thus far devised produces a pulsating action like that of the hand, by means of a vacuum apparatus. Pipes connect the apparatus with closed cans attached to the cows' udders. Milking machines are usually expensive to set up and to keep in good condition, and they have not as yet come into general use.

MILK SNAKE, or **HOUSE SNAKE**, a snake common in North America, where it often enters barns and other buildings in search of mice, which constitute its principal food. Though it is quick and alert, it is entirely harmless. Its name is derived from the belief once entertained, that it enters dairies and drinks the milk and even that it sucks it from cows. The snake is yellowish white beneath, somewhat darker above, its back being covered with regularly arranged black blotches.

MILK'WEED, the name of a family of herbs that have curiously complicated little flowers, and whose pods are filled with flat seeds, each bearing a tuft of silky down. The plants take their name from their thick and bitter milky juice. In the tropics some members of the family are climbers and are

cultivated for their beautiful flowers. The common milkweed is found in the United States and Canada in fields and lowlands from the longitude of New York west to that of Nebraska. The stems, which are about four feet high, are downy; the leaves are pale, and the numerous purplish flowers grow in clusters at the end of a stalk. The flowers have a sweet, sickening odor. As the plant is propagated both by its seeds and by its creeping roots, it becomes a troublesome weed, which is best eradicated by heavy cultivation.

MILKY WAY, or **GAL'AXY**, a long, luminous, star-filled track which is seen at night stretching across the heavens from horizon to horizon and which, when fully traced, is found to encompass the heavenly sphere like a girdle. This luminous appearance is due to a multitude of stars, so distant and blended as to be distinguishable only by the most powerful telescopes. At one part of its course it divides into two great branches, which remain apart for a distance of 150° and then reunite. In many places smaller branches are given off. At one point it spreads out very widely, exhibiting a fanlike expanse of interlacing branches, nearly 20° broad; this terminates abruptly and leaves a kind of gap. At several points are seen dark spots in the midst of some of the brightest portions; one of the most easily distinguished of these is known as the "coal sack." See **ASTRONOMY**.

MILL, **JAMES** (1773-1836), a British philosopher and economist. He began a *History of British India* in 1806 and published it in 1818. In consequence of the knowledge which his researches had given him of Indian affairs, he became chief examiner of correspondence for the East India Company. He wrote articles on social and political subjects; published a treatise on the *Elements of Political Economy*, written largely as an educational work for his son, John Stuart Mill, and an able *Analysis of the Human Mind*.

MILL, **JOHN STUART** (1806-1873), an English philosopher, was born in London. At the age of fourteen he entered upon a course of political economy. His fifteenth year was spent in France; on his return he studied law for a time, and in 1823 obtained a clerkship in the East India Company, remaining in the company's employment till 1858. He was elected to Parliament in 1865 and used his influence on the side of the ad-

vanced Radicals. From 1835 to 1840 he was principal conductor of the *London and Westminster Review*, in which were published many of his articles. In 1843 appeared the first of his two chief works, *A System of Logic, Ratiocinative and Inductive*, the second, *Principles of Political Economy*, appearing five years later. To these he afterward added *On Liberty*; *Utilitarianism*; the *Examination of Sir William Hamilton's Philosophy*, and a *Study of Auguste Comte and Positivism*. Mill's works on logic and political economy are standard text-books.

MILLAIS, *mil'lay*, **JOHN EVERETT**, Sir (1829-1896), an English painter, born at Southampton. In his earlier days he was a leader of the Pre-Raphaelite school, but on attaining maturity in art he abandoned the peculiarities for which the school is noted. He drew his subjects from all sources, using landscape, scriptural and mythological themes, as well as those of everyday life. Among his best works are *The Huguenot Lovers*, *The Boy Princes in the Tower*, *Spring, Chill October*, *Ferdinand Lured by Ariel*, *Marianna in the Moated Grange* and *Ophelia*. In portraiture Millais held first rank and painted a number of the most distinguished men of his day. He was made a member of the Royal Academy in 1883, became a baronet in 1885 and in 1896 was elected president of the Royal Academy.

MILLEN'NIUM, a word meaning *one thousand years*, commonly applied to a period in the future when Christ will return and rule over a world freed from sin. In the twentieth chapter of *Revelation* there is recorded the prophetic vision of Satan bound for a thousand years, after which will come the last Judgment and the end of the world. Upon this passage belief in the Millennium is based. Theologians vary considerably in their interpretation of *Revelation*, and there are many different views as to the Millennium. The term is used in a general way to mean a period of perfection indefinitely in the future.

MILLER, **CINCINNATUS HEINE** (1831-1913), an American poet, better known as **JOAQUIN MILLER**, because of a defense he wrote for a Mexican bandit named Joaquin. He was born in Indiana, but went west with his father at an early age and spent some time in the California mining districts. For five years he lived among the Modoc Indians, and after that he attempted with little suc-

cess to practice law in Idaho. In 1863 he undertook the management of the *Democratic Register*, published at Eugene, Oregon, but the paper did not long exist. He was admitted to the bar in Oregon and became district judge in Canyon City. After 1870 he lived in New York, Washington and Oakland, Cal. Miller's first volume of poems, *Songs of the Sierras*, attracted considerably more notice in Europe than it did in the United States. Among his other works are *Songs of the Sun Lands*, *Songs of the Mexican Seas* and several novels. His poems show descriptive and dramatic power, but lack artistic form.

MILLET, the common name for various species of grasses that produce roundish grains. The millets have been valued forage crops for many hundreds of years, and in many parts of the East they are important sources of food supplies. In India and Japan it has been estimated that more than 75,000,000 acres are planted annually. In the United States and Canada millet is raised as a forage



MILLET

plant and to some extent as a food for poultry. It is practically free from attacks of insects and plant diseases.

MILLET, *mil lay'*, JEAN FRANÇOIS (1814-1875), a French artist, born at Gruchy, near Cherbourg. He worked with his peasant father in the fields until he was eighteen years old. After this he studied drawing at Cherbourg and Paris, living in great poverty. It was not until he was thirty-five years old that he could do more than support himself by the sale of small pictures, but towards the

end of his life he reaped the rewards of his steadfast perseverance. In 1849 he left Paris and settled among the peasants of Barbizon, on the edge of Fontainebleau Forest, and devoted himself to transferring their simple, everyday life to his canvasses, which he did with great truth of sentiment and poetic charm. Of his paintings may be mentioned *The Sheep Shearers*; *The Gleaners*, probably his masterpiece; *The Sower*; *The Shepherdess with Her Flock*, and *The Angelus*. The last was sold by auction in Paris in 1889 for about \$115,000. It is privately owned and is not exhibited.

In the article *Painting* the reader will find reproductions of *The Gleaners* and *The Angelus*, with other details about the artist.

MILLIKAN, ROBERT ANDREWS (1868-), an American physicist, was born in Morrison, Ills. He was graduated from Oberlin College in 1891, and pursued his studies in Germany. From 1896 to 1921 he was a member of the faculty of the University of Chicago. In 1921 he became director of the Norman Bridge Laboratory of Physics at the California Institute of Technology at Pasadena. He was the first to succeed in isolating the electron. This achievement, of high importance to science, gained for him many awards, including the Nobel Prize in physics in 1923.

His published works include: *Electricity, Sound and Light* (1908); *The Electron* (1917); *Evolution of Science and Religion* (1927).

MILNER, ALFRED, Viscount (1854-1925), an English statesman whose fame rests chiefly on his services in connection with British supremacy in South Africa. He began his public career as a journalist, later was private secretary to the Chancellor of the Exchequer (1887-1889), and from 1889 to 1892 was Under-Secretary for Finance in Egypt. In 1897 Milner was appointed High Commissioner for South Africa and governor of the Cape of Good Hope, and in 1901, during the Boer War, he became governor of the Transvaal and Orange River colonies. In December, 1916, he was appointed Minister without portfolio in the Lloyd George Coalition Cabinet, and when Lloyd George formed a new cabinet in 1919, after the general election, he appointed Viscount Milner Secretary for the Colonies.

MILO. See MELOS.

MILREIS, *mil rees'* or **MILREA**, *mil ré'*, the monetary unit of the republic of Brazil,

its value in the monetary system of the country about \$0.42 of United States money, subject to frequent fluctuation. In both cases it is divided into one thousand *reis*, and coins in multiples of both the unit and of the subdivisions are issued in both gold and silver. See COINS, FOREIGN.

MILTIADES, *mil tī'a deez* (?-500 B. C.), an Athenian general, hero of one of the decisive battles of history. When Greece was invaded by the Persians, he was elected one of the ten generals and drew up his army on the field of Marathon, 490 B. C., where he gained a memorable victory and saved Greece from Asiatic domination. In the following year he persuaded the Greeks to entrust him with a fleet of seventy vessels, in order to follow up his success. With this, to gratify a private revenge, he attacked the island of Paros, but was repulsed and dangerously wounded. On his return to Athens he was impeached and was condemned to pay a fine of fifty talents. Being unable to pay, he was thrown into prison, where he soon after died of his wound.

MILTON, JOHN (1608-1674), an English poet, whose genius is considered second only to that of Shakespeare. He wrote one of the world's finest epics—*Paradise Lost*—and his fame is lasting. Milton was born in London. His earliest education was received from his father and from private tutors, but in 1620 he was sent to Saint Paul's School. There he studied ancient and modern languages, also becoming acquainted with Spenser's writings, which influenced him



JOHN MILTON

greatly. At the age of seventeen he entered Christ's College, Cambridge, where he remained for seven years. His *Hymn on the Nativity* was written during his university days. Leaving the university, he went to live with his father, who had retired to Horton in Buckinghamshire, and there he remained for six years. In this retreat he studied classical literature, philosophy, mathematics and music, and he wrote four poems which rank with the greatest lyrics in the language. These are *L'Allegro* and *Il Penseroso*, the masque *Comus* and the elegy *Lycidas*.

In 1637, on the death of his mother, Milton made a Continental journey, in which he visited Paris, where he was introduced to Grotius; Florence, where he met Galileo; Rome, and Naples. Hearing while in Italy that civil war was threatening in England, he returned at once. The home at Horton had been broken up, and Milton settled in London, where he undertook the education of his two nephews, the sons of his sister, and the sons of a few personal friends. Before long he was drawn into the ecclesiastical struggle which was raging, and one treatise after another in defense of the Puritans came from his pen. In the summer of 1643 Milton married Mary Powell, the daughter of a royalist family, but she found his habits austere and his house dull and returned to her father about a month after marriage. In 1645, however, she returned and continued to live with him until her death in 1652.

When, in 1649, Charles I was executed and a republic established, Milton avowed his adherence to it in a pamphlet, *Tenure of Kings and Magistrates*, and was appointed foreign secretary to the commonwealth. In his literary work his eyesight suffered so much that in 1652 he became totally blind. Nevertheless, he continued Latin secretary, with the assistance of Andrew Marvell, and dictated some of Cromwell's most important dispatches. When Charles II was restored a few months later, the blind politician remained in hiding, his books were burned by the common hangman and he himself narrowly escaped the scaffold. He had married a second wife in 1656, who died in 1658, and in 1663 he married a third time.

The last years of his life were spent in seclusion, in the composition of his greatest work, *Paradise Lost*. Blind as he was, his daughters were called on to read to him and to take down his verses, and they accepted the task in no pleasant spirit. They were disrespectful to him, sold his books by stealth and grumbled over his third marriage. Above all these troubles, however, Milton rose triumphant, and his great epic contains many passages which have never been surpassed in English poetry. *Paradise Lost* was published in 1667, *Paradise Regained* and *Samson Agonistes*, a tragedy, in 1671. Besides these works, Milton wrote a number of beautiful sonnets, the one *On His Blindness*, perhaps, the best-known of all English sonnets. His prose writings, though elegant in

style, are often violent in tone, and they have, moreover, little of interest in the present day. *Areopagitica*, a defense of the freedom of the press, is the best of these writings.

MILWAUKEE, WIS., the twelfth city in size in the United States, the largest in the state and the county seat of Milwaukee County, is situated on Lake Michigan, 85 miles north of Chicago. The abrupt shores of the lake at this point are from 80 to 125 feet high and are cut by the Milwaukee River, which forms a part of the splendid harbor. The Menominee and the Kinnickinnic, two large rivers which flow into the Milwaukee River within the city limits, render the location more picturesque. These natural advantages have made Milwaukee one of the most beautiful cities of the northwest.

The plan of the city is regular; the streets are broad and nearly 700 miles of them are paved and laid in asphalt. The business center is near the lake, while the best residence districts crown the hills and ridges, following the lake shore northward.

The Chicago & North Western, the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago, North Shore & Milwaukee, the Pere Marquette and the Minneapolis, Saint Paul & Sault Sainte Marie provide abundant inter-city transportation. Carferry lines across the lake are conducted by the Grand Trunk-Canadian National and the Pere Marquette railways. Six bus companies serve the city. There are five airports and three passenger steamer docks.

The 58 parks and playgrounds cover an area of 1,113 acres; Lake Park is on the shores of Lake Michigan; Mitchell Park is famous for its conservatory; Washington Park boasts a zoo that is nationally famous; six of the parks have golf links; 15 places for bathing are maintained.

The school population is over 90,000 and is provided with public education facilities in some 125 buildings. The public museum accommodates 1,000,000 visitors annually. Higher education and professional training are afforded at Marquette University, Milwaukee-Downer College, Mount Mary College, an extension division of the University of Wisconsin, a state teachers college, Concordia Junior College, the School of Engineering of Milwaukee, the Milwaukee Art Institute, and the Layton Art School. There are 280 churches and 44 hospitals in the city. The

public library contains nearly 800,000 volumes; one-fourth of the population hold library cards; each family borrows 40 books annually. Milwaukee has won first place among cities of more than 100,000 population in the prevention of fire waste.

The excellent harbor, protected by a breakwater two miles long, has been a great stimulus to commerce. The wholesale trade area embraces Wisconsin, Upper Michigan and other adjacent territory; in one year 128 companies did \$170,000,000 worth of business. There have been at times as many as 7,000 retail establishments in the city. The manufacturing interests of the city are large in proportion to its population; the chief products are machinery, clothing, packed meats and leather goods. Milwaukee has had the largest ore crusher, hydro-electric unit, electric and heat treating furnace in the United States. The city is famous for the manufacture of beer, bottling machinery, steel and wood cooperage.

The chief officer of the city is the mayor. The council contains 27 members. There are 35 committees and commissions that assist in administering the city's affairs. The Association of Commerce renders great assistance in safety education by means of a foreman's safety school that serves 375 industries.

History. In 1818 Solomon Juneau built a little log cabin on the east side of the Milwaukee River, and this is considered the first permanent settlement of Milwaukee, although trading posts had been established there before and Jesuit priests had located in the vicinity. A village of Pottawatomi Indians was then in existence at this point. The region around Juneau's house was known as Juneautown. The west side of the river, which was settled by Byron Kilbourn in 1734, was called Kilbourn town, and the region south of the Menominee River was called Walker's Point, for George H. Walker, who settled there in the same year. For a long time there was bitter rivalry among the three villages, but this gradually died out, and Juneautown was organized as the village of Milwaukee in 1837. Two years later Kilbourn town was annexed, and in 1845 Walker's Point was joined, and the three settlements were incorporated as the city of Milwaukee. Solomon Juneau was chosen the first mayor.

Population. The population of Milwaukee

in 1930 was 578,249. It is a mixed population, in which for many years people of German birth largely predominated; in fact, for many years in its early history, German customs were more in evidence than those of America. During the Civil War a company was formed composed wholly of German turners. More recently Poles, Italians, Russians, Dutch, Scandinavians, Bohemians and other peoples have colonized parts of the town and although certain wards still are solidly German 75.4 per cent of the inhabitants are native born.

MIMEOGRAPH, *mim'e o graf*. See COPY-ING DEVICES.

MIMICRY, *mim'ikri*. See PROTECTIVE COLORATION AND MIMICRY.

MIN'ARET, the tower of a mosque. A mosque has one or more minarets, often as many as four, one at each angle of the enclosure; one mosque, that at Mecca, has seven. The minaret is generally a slender, polygonal or cylindrical shaft of brick or stone. It has several stories, with projecting balconies from which the muezzin calls the people to prayer. It terminates in a tapering cone, crowned by a pinnacle or small dome, and is ascended by a narrow, spiral staircase. Many examples are found in the architecture of the thirteenth and sixteenth centuries in Egypt, Spain, Syria, India and Turkey. See MOSQUE.

MINAS BAY, or **BASIN OF MINAS**, the name given to the eastern arm of the Bay of Fundy. It extends for nearly sixty miles into Nova Scotia. The tides in the basin are very strong and have been known to reach the height of sixty or seventy feet. The principal river which empties into the bay is called the Avon. The village of Grand Pré, celebrated in Longfellow's *Evangeline*, is situated on the Bay of Minas.

MIND, the sum of the powers of knowing, feeling and willing, the entire spiritual nature, or the soul. From Aristotle to modern philosophers, many theories as to what mind is, have been advanced, and their elaboration and discussion have presented some of the most difficult problems of metaphysics. The early theories consider the mind as separate from the body, but later theories recognize the intimate relation between mind and body. The study of physiological psychology has shown that mental action is based upon certain physiological conditions. Many psychologists use mind and soul as synony-

mous terms, while others consider mind the more comprehensive term and restrict the term *soul* to those activities connected with the religious nature. See PSYCHOLOGY.

MINDANAO, *min da nah'o*. See PHILIPPINE ISLANDS.

MINDORO, *min doh'roh*. See PHILIPPINE ISLANDS.

MIND READING. The question as to whether the thoughts of one person can be read by another is one about which there is much controversy and disagreement. A common experiment used to prove the affirmative side consists in having someone find a hidden object. This person usually follows a guide who knows the location of the hidden object. He places the hand of this guide on his forehead or arm, and both concentrate their minds on the same subject, the hiding place. In many instances the seeker does reach the concealed object, and the reason given is that he was guided by the thoughts of the person with whom he is in close contact. Psychologists sometimes call this muscle reading, and explain the experiment by saying that the guide unconsciously indicates the direction by reflex action of his muscles. The seeker is guided by a series of yielding and resisting movements, of which both persons are not directly conscious. Telepathy, as mind reading is scientifically called, is being zealously studied, but no agreement of opinion has yet been reached.

MINE, SUBMARINE. See SUBMARINE MINE.

MINERALS AND MINERALOGY, *min er al'o ji*. Everything that has life or which living things have produced belongs either to the animal or to the vegetable kingdom. Everything which never has lived is classed in the mineral kingdom. Animals and vegetables are composed of many dissimilar parts; minerals are called *homogeneous*, that is, every part of any mineral is exactly like every other part of it. A block of coal may be broken into thousands of small pieces, but every piece is as truly coal as was the original block. Coal, as is true of every other mineral, is composed of component parts, as the chemist discovers on examination; in each little speck of coal these component parts are present in the same proportions as in the larger piece. A grain of gold is as truly gold as is a nugget which weighs many ounces.

Animals and plants have various organs; minerals are inorganic. Animals and plants grow from the inside; minerals grow by additions from the outside. A mineral is defined as "any chemical element or compound occurring naturally as a product of inorganic processes" (Webster). Mineralogy is the science which makes known all facts relating to minerals. It includes the study of all inorganic substances in the earth and on its surface. As distinguished from geology, mineralogy deals with the various mineral bodies as separate substances forming the earth's crust and examines their properties as such, while geology treats them together as building up the crust of the earth. Mineralogy is closely related to chemistry, since without a knowledge of this branch of science, it would be impossible to determine the composition of minerals.

Minerals are classified according to their structure, their chemical composition and their physical conditions. In structure, solid minerals are either crystalline or massive. When the former, they conform to some system of crystallization. Another important test is hardness (which see).

Apparently all minerals once existed in a fluid or molten state and have been changed to their present condition through crystallization, by evaporation of their water content; through condensation, or through heat processes. Salt is an example of the first process, sulphur, of the second; and many rocks, of the third.

Related Articles. All the minerals are described in these volumes, and attention is directed to titles relating to them. Consult the following, also:

Chemistry
Crystallization

Geology
Hardness

MINERAL WATERS, the term commonly, but somewhat erroneously, applied to the spring waters that contain an unusual quantity of such substances as sodium, magnesia, iron, carbonic acid and sulphur. It has not been found practical or useful to classify mineral waters under their chemical elements, but the attempt has been made, springs being described as salt, earthy, sulphur, iron, alkaline or alkaline-saline. Besides the substances which these terms indicate, the waters are frequently impregnated with carbonic acid gas.

Mineral Springs. As these waters have curative properties, mineral springs in various parts of the world have been utilized as

spas, or resorts for invalids. In the United States there are a number of these. One at Saratoga Springs, N. Y., has been made a state reservation, and that at Hot Springs, Ark., is under Federal control. Others of note include Glen Springs, Watkins, N. Y.; White Sulphur Springs, W. Va.; French Lick Springs, Ind.; Warm Springs, Ga.; Mount Clemens, Mich. In some of these places, the waters are taken internally; in some, they are for bathing only. There are other springs of proved merit.

MINERVA, *min ur'va*, in classical mythology, the Roman goddess of the intellectual powers. To the Greeks she was known as Athene. She was the daughter of Jupiter and Metis. According to popular legend, before her birth Jupiter swallowed her mother, and Minerva afterwards sprang from the head of Jupiter.

Whatever other qualities she might possess, and these were many, she was always the symbol of the thinking faculty, the goddess of wisdom, science and art; but she was also a skilled warrior and the protector of warriors and is therefore usually represented completely armed, her head covered with a gilt helmet. At times, however, as the goddess of the peaceful arts, she appeared in the dress of a Grecian matron. Her distinctive symbols were the aegis and the gorgon's head, and the olive tree was sacred to her. Athens, which was named after her, was the city in Greece most sacred to her, while at Rome, also, she had several temples.

MINIMUM WAGE, the lowest wage that can legally be paid. Legislation on this subject is based on the principle that it is detrimental to the worker and to the community alike for people to work for wages too low to enable them to live decently. Accordingly in enlightened countries the movement is growing rapidly to make it illegal to pay less than a living wage. Boards of investigation which gather statistics and other information are a necessary part of this movement.



MINERVA

Minimum-wage legislation was the subject of experiment first in Australia, in 1896. About fifteen years later England took official notice of wrongs to its unfortunates when a commission disclosed that in a single industry one-fourth of the employees were receiving only 5s. 6d. (about \$1.35) per week. In 1912 Massachusetts passed the first minimum-wage laws in the United States, and about twenty states have adopted such legislation since that time. There is a profound belief that any industry that cannot pay a wage larger than what is sufficient merely for subsistence is a liability to its community.



MINING. In its broadest meaning, mining comprehends all the processes whereby the useful minerals are obtained from their natural localities beneath the surface of the earth, together with the subsequent operations by which many of them must be prepared for the purposes of the metallurgist (see METALLURGY). As the term is now generally used, it means the art of obtaining the ores from the earth, while the processes connected with separating the metals from their ores are included under *metallurgy*.

All mineral deposits are divided into two very broad divisions. The first includes the beds, or seams, of iron ore, coal and salt. These are deposits laid out more or less horizontally and parallel to the stratification of the surrounding rocks. The second class includes mineral veins, or lodes. The mining appliances employed are very different in the two classes of deposits. In the first class, it is desirable to make a hole of the shortest possible depth from the surface of the ground to the bed of mineral. A shaft is therefore sunk through valueless beds until the mineral is reached. Machinery is then used to extract the whole of the mineral, due precautions being taken to avoid danger from falls of roof and from noxious gases. In the second class of deposits, the inclination of the mineral vein has to be taken into account, as the deposit varies considerably in inclination and in size. The vein must therefore be studied foot by foot, downward from the top. In some cases a vertical shaft is

sunk, and passages, known as *cross-cuts*, or *levels*, are driven from this to the vein at different depths. A vertical shaft presents the advantages of greater ease in sinking, hauling and pumping. In the search for mineral deposits, the best evidence is obtained by putting down bore holes. These are made by various methods and are sent to a depth of a few feet, when required for testing the character of the foundation subsoil, or, in other cases, to thousands of feet, when required in seeking for or estimating the value of deposits of coal, salt and iron.

In order to open up a mine, tunnels, or entries, are driven into the lode or bed whenever the contour of the country admits of this scheme. Shaft sinking involves a larger outlay of capital and greater working cost. In the ordinary method of sinking shafts, the workmen, standing upon the bottom of the pit, blast out the rock and send the excavated material to the surface by means of an engine, rope and bucket. The sides of the shaft are supported by timbering or walling. By the use of steam or electric power for operating the hoisting apparatus, shafts can be sunk to almost any depth desired. The deepest shaft in the world is at the Calumet and Hecla copper mine, Calumet, Mich. It exceeds 5,000 feet. The cutting of a path through the harder rocks, as carried on by the ancient miners, was particularly laborious. Previous to the introduction of blasting, the implements used were of the nature of wedges and hammers. Bit by bit pieces of rock were broken away, the operation being aided by natural fissures in the rock and by the brittleness of the hard material. In this way the ancient miners cut coffin-shaped galleries 6 feet in height. At the present time the galleries, or levels, are usually 7½ feet high and 5 or more feet wide, thus affording greater facility for traveling and for ventilation. In the operation of blasting, use is made of a drill of steel. This may be struck with a hammer, but nearly everywhere rock drills driven by steam, compressed air or electricity are in use. The bore hole, when finished, is then charged. Gunpowder, compressed powder, dynamite and gun cotton are employed. Nitrated gun-cotton has also given admirable results. The fullest benefit of these modern explosives can be obtained only by the use of strong charges fired by electricity, by which it is possible to place a number of bore holes in such a

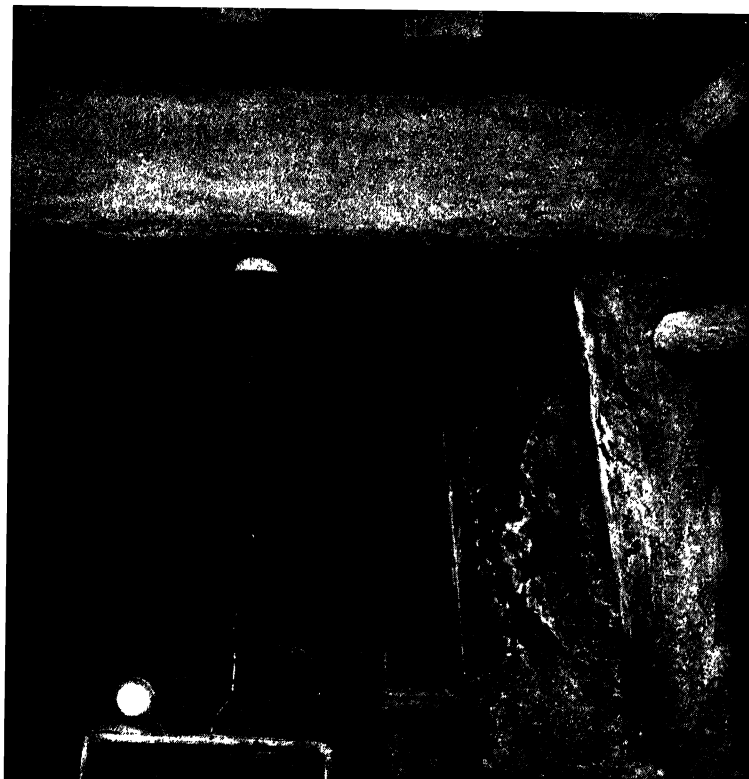


SURFACE MINING FOR RARE MINERALS

From almost inaccessible mountainside to desert wasteland, the world over, come a surprising variety of minerals necessary to modern manufacturing requirements. Among these are: 1. Sillimanite, an aluminum-silicate used in automotive construction. 2. Sand, for glass making. 3. Bauxite, aluminum ore. 4. Asbestos.

Kaufmann-Fabry

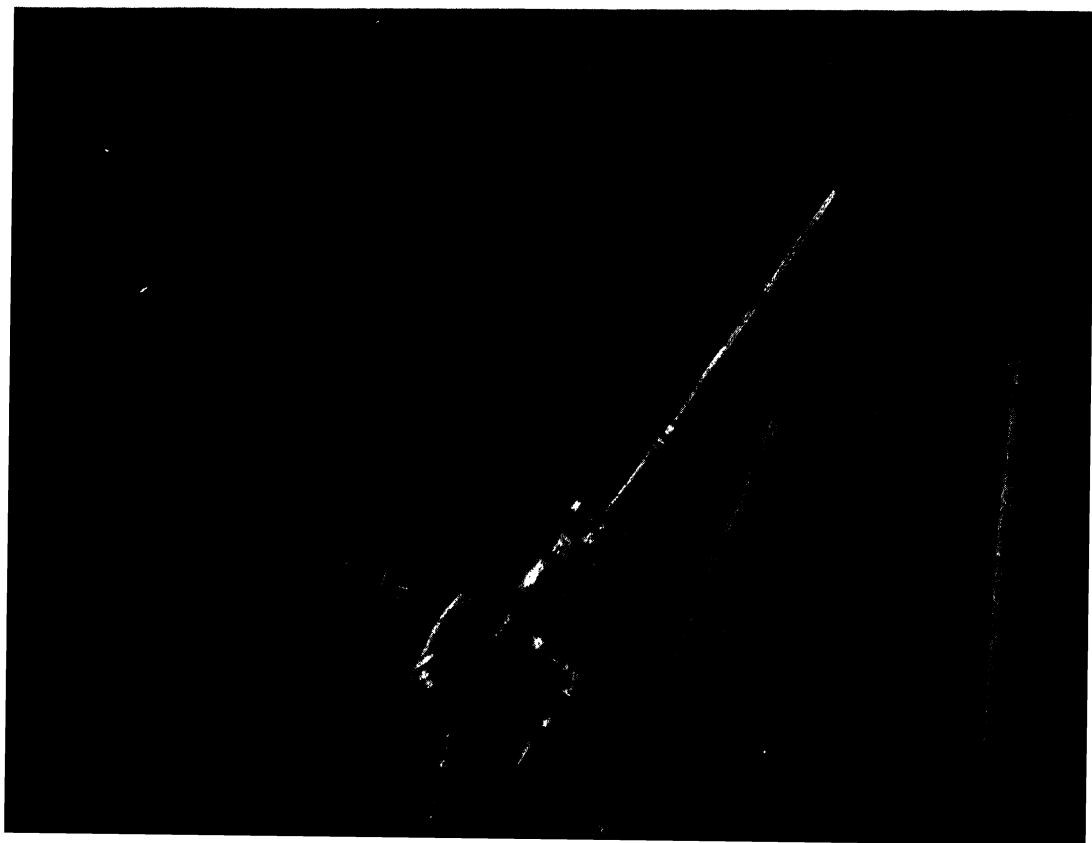




SCIENTIFIC DEPTHS MINING

Iron mine above; Copper mine below. Electrically lighted and ventilated tunnels through solid rock; high pressure pneumatic drills; motor-driven conveyor cars and elevators have minimized the dangers and vastly increased production of iron and copper ore.

Kaufmann-Fabry



manner that when fired together they shall help one another. For removing coal, these high explosives are too quick in their action, and blasting powder continues to be used.

Related Articles. Consult the following titles for additional information:

Coal	Minerals and
Gems	Mineralogy
Geology	Stone Age
Metals	

MINISTER PLENIPOTENTIARY, *plen i po ten'shi a ri*. See ENVOY EXTRAORDINARY, subhead *Envoy Extraordinary and Minister Plenipotentiary*.

MINISTER RESIDENT, a diplomatic officer accredited to a country so small that a diplomat of high rank is not needed. The minister resident has all the powers of a minister plenipotentiary. See ENVOY EXTRAORDINARY.

MINISTRY, the name sometimes given to the heads of the executive departments of a government, taken collectively. It is usually synonymous with the term *cabinet*, though in some countries, as in Great Britain, the ministry includes, besides the cabinet, many under-secretaries of departments, who have seats in Parliament. See CABINET.

MINK, a small mammal belonging to the weasel family, whose beautiful thick coat makes it one of the most valuable of the fur-bearing animals. The various species are found in all parts of North America and in Europe and Northern Asia, those of the coldest regions producing the costliest fur. The fur is brown, varying from light to dark, and is thick and glossy. It is used for making muffs, collars, coats, etc.

Minks live in burrows which open near ponds and streams, and they spend part of their time in the water, as they are skilful swimmers. They feed on fish, frogs and other water animals, and to a less extent on birds, eggs and small land animals. Like skunks, they have glands that secrete a liquid of penetrating odor, but it is extremely disagreeable only when the animal is in a rage. American minks are about two feet long; European species are a little smaller. See FUR AND FUR TRADE.

MINNEAPOLIS, *min ē ap' o lis*, MINN., a thoroughly modern city, noted for its natural beauty, progressive spirit, hospitable people, steady growth and for the 11 lakes lying within the city limits. It is the county seat of Hennepin County, the largest city in the state, fifteenth in size in the United States, and the world's chief center for the manufac-

ture of flour, and is situated in the southeastern part of Minnesota at about the geographical center of North America and at the head of navigation on the Mississippi River. It is 424 miles northwest of Chicago and 581 miles north of Saint Louis. In 1930 the population was 464,356. With its suburbs and the nearby city of Saint Paul, adjoining it on the east, there is formed a community of 900,000 inhabitants.

Its location may be said to have determined its destiny as a great industrial center. Situated in the midst of a rich grain, dairying, and lumber district, with excellent shipping facilities, and having the Falls of Saint Anthony in the heart of its business district to furnish unexcelled power, Minneapolis could not be other than prosperous and aggressive. The trunk line railroads that enter it are: the Great Northern, the Northern Pacific, the Chicago, Burlington & Quincy, the Chicago & North Western, the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago Great Western, the Minneapolis & Saint Louis, the Minneapolis, Saint Paul & Sault Ste. Marie, the Chicago, Rock Island & Pacific, and the Minneapolis, Northfield & Southern Railway. There are 10 major bus lines and a municipal airport; Robbinsdale Airport is five miles from the business center.

General Description. Minneapolis covers 58 square miles, extending on both banks of the Mississippi for 10 miles and having an extreme east and west extent of six miles. The river divides the city into two unequal divisions, generally known as the North Division and the South Division. Below the Falls of Saint Anthony the Mississippi River flows through a deep gorge, and within the city limits the river is spanned by twenty bridges. The city is built upon nearly level ground and is regularly laid out, most of the streets running at right angles.

Minneapolis is noted for its wide, clean streets and its simplified street numbering system of 100 numbers to a block. Hennepin Avenue is the theatrical street of the city; Nicollet Avenue the smart shopping street known as "The Fifth Avenue of the Northwest"; Marquette Avenue is the financial district and, like the other streets identified here, was named after an early pioneer in the Northwest.

The wholesale and manufacturing districts—one of the largest wholesale centers in the United States—are located on both banks of

the river and extend as far as the city limits. In the south and north sections of the city there are handsome residential districts.

Parks and Boulevards. One-tenth of the city's area is given over to parks, which total 141; playgrounds, tennis courts and other recreational fields number more than 300. A boulevard system 58 miles in extent connects the 11 lakes and the parked areas, and there are beautiful drives traversing them. The system known as the "Grand Rounds," including Victory Memorial Driveway, encircles the city, borders the lakes, and goes through many of the most beautiful residential sections. Included also are the parks of the southwest in which are situated Lakes Calhoun, Harriet, Cedar, Nokomis, and Lake of the Isles, all beautiful sheets of water. The "Grand Rounds" reaches the river at Minnehaha Park, in which are located Minnehaha Falls, immortalized in Longfellow's "Hiawatha," and the statue of "Hiawatha" and "Minnehaha" which was paid for with school children's pennies. From Minnehaha Park the boulevard continues along the river gorge to the University of Minnesota.

Buildings and Institutions. The city contains many modern public buildings and business blocks. Among these is the county court house and city hall costing \$3,500,000. This structure occupies an entire block. It has a tower 350 feet high; in the upper story in an observatory from which an excellent view of the city can be obtained. Other buildings are the \$4,000,000 Post Office, covering a city block; the Minneapolis Art Museum; the Minneapolis Auditorium, with a seating capacity of 10,545; the Northwestern Bank Building; First National-Soo Line Building; Baker, Frontenac, Roanoke, and Medical Arts Buildings; Ninth Federal Reserve Bank, wholly without windows; 25-story Rand Tower, 30-story Northwestern Bell Telephone Building, and 32-story Foshay Tower; Minneapolis Civic and Commerce Association Building; the Public Library, containing about 605,000 volumes; the Walker Art Gallery; the Gateway Information Building of the Minneapolis Civic and Commerce Association; Northrop Memorial Auditorium; McKnight and Metropolitan Bank Buildings; the Chamber of Commerce, one of the largest, wheat, barley, rye, and flax markets in the United States; the Curtis, Leamington, Francis Drake, Sheridan, Radisson, Dyckman, Andrews, Nicollet, and West hotels.

The city has many large and beautiful churches. The most important are: The Basilica of St. Marys, Saint Mark's Episcopal, Second Church of Christ, Wesley Methodist, Plymouth Congregational, Park Avenue Congregational, Westminster Presbyterian, First Unitarian, and the Church of the Redeemer. The 43 buildings of the University of Minnesota, on the east bank of the river, are of special interest. Augsburg College, the Minneapolis College of Law, the MacPhail College of Music and the Kindergarten-Primary Training School also offer higher education and professional training.

Industries. Minneapolis has long been known as the largest center for the manufacture of flour in the world; its combined mills have a capacity of 52,800 barrels in 24 hours. These mills are situated on both banks of the Mississippi at the head of the Falls of Saint Anthony. Other leading industries are: textiles and their products, printing and publishing, linseed oil cake and meal, foundry and machine shop products, food products, bakery products, iron and steel products, car and general construction and repairs, steam railroad repair shops, electrical machinery, forest products, clothing, furniture, office fixtures, coffee roasting and grinding, and planing mill products. A wide variety of commodities used in business and the home are manufactured by 1,200 manufacturing plants.

History. Father Louis Hennepin discovered the Falls of Saint Anthony in 1680, and the advantages of the site were pointed out by a traveler who visited the place about a century later. In 1807 Zebulon Pike concluded a treaty with the Sioux Indians, by which the heart of the present city became United States territory. The government erected Fort Snelling (south of Minnehaha Park) in 1820, and four years later a flour and lumber mill was set up. In 1837 the village of Saint Anthony was marked out on the east bank of the river. This was later surpassed by a settlement on the other bank, started in 1859, and chartered as the city of Minneapolis in 1867. Saint Anthony was annexed in 1872, and the city entered upon an era of uninterrupted prosperity. The name Minneapolis is a combination of the Indian word "minne," meaning water, and the Greek word "polis," meaning city.

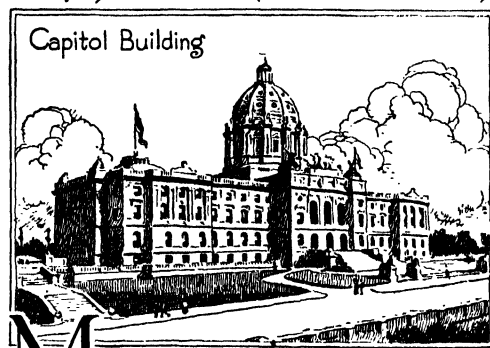
The city is governed by a mayor and a council of 26 members; two aldermen are elected from each of the 26 wards.

MINNEHA'HA, an Indian name meaning *laughing water* borne by the heroine of Longfellow's *Hiawatha*. She is portrayed as the daughter of an old arrow maker, and described as

Handsomest of all the women
In the land of the Dacotahs,
In the land of handsome women.

Minnehaha is also the name of a small stream in Minnesota and of a celebrated cascade in that river.

MINNESINGERS, the name applied to the minstrel singers who traveled about Germany in the twelfth and thirteenth centuries. They composed the words and music for their songs, which treated chiefly of love, but also religion, nature and historical and political events. Among the minnesingers was Wolfram von der Vogelweide, the author of *Parzival*, upon which Wagner's music drama *Parsifal*, was based. (See **MASTERSINGERS**).



MINNESOTA, one of the leading states of the Union in natural resources, situated in the north-central part of the United States and in the geographical center of North America, halfway between the line of perpetual frost on the north and the line of no frost on the south. It is bounded on the north by the Canadian provinces of Manitoba and Ontario, on the east by Lake Superior and Wisconsin, on the south by Iowa and on the west by the Dakotas. The eastern portion of the northern boundary consists of a chain of lakes and rivers, of which the Rainy River and Lake of the Woods are the most important. The eastern boundary is formed almost entirely by Lake Superior and the Saint Croix and Mississippi rivers, and a large portion of the western boundary is formed by the Red River of the North. Its water boundary is about two-thirds that of the entire state line.

Minnesota has several popular names, the most common, **GOPHER STATE**, referring to the large number of gophers found there. It is also called the **BREAD AND BUTTER STATE**, because of its great production of flour and dairy goods; again, its motto, "Star of the North," has given rise to the name **NORTH STAR STATE**. Minnesota is the Indian name for *sky-tinted water*.

Area and Population. Minnesota, with a gross area of 84,682 square miles, is the eleventh state of the Union in size, being slightly smaller than Utah, and exceeding Idaho by about 800 square miles. It has a water area of 3,824 square miles, for hundreds of lakes dot its surface.

In 1920 the population was 2,387,125. According to the Federal census in 1930, its population had increased to 2,563,953, giving it the rank of eighteenth among the states of the Union, and a density of 37.1 persons to the square mile, the average for the whole country being 41.3.

Minnesota has a high percentage of foreign born population, Swedes, Norwegians and Germans predominating, in the order named. There are also about 9,000 Indians occupying reservations.

Minnesota is predominately a farming state, with few large cities. The "Twin Cities," Saint Paul and Minneapolis, form a community of about 600,000 souls, but aside from these great centers there are but nine cities with a population over 12,000—Austin, Duluth, Faribault, Hibbing, Mankato, Rochester, St. Cloud, Virginia and Winona. At least half the inhabitants of Minnesota live under rural conditions.

Surface and Drainage. Notwithstanding its large area, Minnesota contains no lofty mountains or deep valleys. A height of land with an elevation of about 1,700 feet extends in an irregular line approximately east and west through the north-central section. From its slopes, rivers flow in all directions. The highest land is in the Mesaba range, in the northeastern part, where the loftiest summits are about 2,200 feet. The region around Lake Superior is the lowest, having an altitude of about 600 feet. From this low land southward and westward to the valley of the Red River of the North the surface consists largely of rolling land, interspersed with streams and lakes and covered with pine or hardwood forests.

Along the Mississippi are high bluffs, which in the southeastern portion of the state reach an altitude of nearly 1,800 feet. The southern tiers of counties are largely rolling prairies, which merge into high parallel swells in the southwest, sometimes known as *coteaus*, and designated by Longfellow in *Hiawatha* as "mountains of the prairie." The valley of the Red River of the North, which includes the northwestern counties, is level.

The drainage includes three river systems. A small section of the northeastern corner of the state drains through the Saint Louis and a number of short rivers into Lake Superior. North of the height of land the rivers flow into the Rainy River and the chain of lakes which connect with the Hudson Bay system. The central and southern portions, including more than one-half of the area, are drained into the Mississippi. The most important tributary of this stream within the state is the Minnesota, which flows in a southeasterly, then northeasterly, direction entirely across the state. The northwestern section is drained into the Red River of the North, whose tributaries are few, only one, the Red Lake River, being of any importance.

Minnesota contains over 7,000 lakes. The largest one that lies wholly within the state is Red Lake. Of the Lake of the Woods, on the northern boundary, only a small portion belongs to Minnesota. What is known as the lake region extends southwards through the central part and contains thousands of small lakes surrounded by timber, noted for the beauty of their scenery, the clearness of their water and the abundance of fish. Many of these are popular summer resorts. On the western boundary are lakes Traverse and Big Stone, the former the source of the Bois de Sioux, and the latter the source of the Minnesota.

Climate. The climate of Minnesota varies to some extent with the latitude. The summers are moderate in temperature, averaging 72° F., with occasional periods of very hot days—90° or even 100° in midsummer. The autumns are mild and pleasant, frosts seldom occurring before the middle of September. The winters are characterized by clear, cold weather, with occasional periods of very low temperature. The springs are short, the transition from winter to summer being quite rapid. The atmosphere is

dry and clear, and the extremes of temperature are therefore not noticed as much as in regions of less variation but of greater humidity. The rainfall for the entire state is about twenty-four inches. It is heaviest in the eastern half and lightest along the western border, but everywhere it is sufficient for agricultural purposes being heaviest in the early summer months.

Mineral Resources. Minnesota is the leading state in the Union in the production of iron ore, and contains what are probably the largest iron mines in the world. These are located in the Mesaba and Vermilion ranges, near the head of Lake Superior. The ore is shipped by rail to Duluth and Two Harbors, and thence it goes by boat to the various points on the Great Lakes, where it is smelted. There are valuable granite quarries at Saint Cloud and Artonville, on Big Stone Lake. A pink limestone of great value as a building stone is found in Blue Earth and Lesueur counties; clay for pottery is quarried at Red Wing, and a dolomite rock is found near Rochester. A brown sandstone is also found near Sandstone, and in Pipestone County are extensive quarries of red quartzite, especially valuable for building and ornamental purposes. At the foot of this quarry is also found the famous deposit of pipestone used for so many centuries by the Indians in making peace pipes. So far as known, this is the only important deposit of this rock in America. Slate occurs in the northern part of the state, and brick clay is quite generally distributed.

Agriculture. Minnesota is one of the leading agricultural states, and it produces large quantities of the best quality of spring wheat, the entire valley of the Red River of the North being especially suited to it. In production of spring wheat Minnesota is exceeded only by North Dakota. Wheat is also grown on much of the tillable land in other parts of the state, so that the entire output is large. Minnesota is also a leading barley state, and produces in addition good crops of oats and corn. Among the vegetables, potatoes are of greatest importance. Hay is raised in large quantities, and dairying and the raising of live stock are important branches of agriculture. In the southern part the more hardy varieties of apples, strawberries and other small fruits are grown successfully, though fruit growing is not a leading industry. On the new lands flax is raised

for the seed, which is used in the manufacture of linseed oil. The fiber to some extent is shipped to manufacturers.

Manufacturers. There is an abundance of water power, and the presence of extensive forests and excellent shipping facilities have combined to develop manufacturing more rapidly than in other states as far west. Minneapolis and Saint Paul are the leading manufacturing centers. The most important line is the manufacture of flour and grist mill products, in which Minneapolis leads the world. The northern part of the state contains the largest forests of white pine found within the Union, and south of these are forests of hard wood, while in various localities are found Norway pine and spruce. Lumbering, of decreasing importance in recent years, is chiefly centered at Minneapolis, Cloquet and Brainerd. Manufactures from wood have, however, increased, and there are many factories for the production of furniture, finishing for interiors and other articles of wood. Slaughtering and meat packing, dairying, the manufacture of machine-shop products and the production of linseed oil are also among the most important industries. The annual value of manufactured products is over \$1,000,000,000.

Transportation and Commerce. The state has the advantage of two important water routes, the Mississippi River and the Great Lakes. The development of railways has rendered the Mississippi of less importance than formerly, but the importance of the lake route grows with the development of the country. Duluth, at the head of Lake Superior, has now become one of the most important shipping points of the country. The Northern Pacific, the Great Northern and the Minneapolis, Saint Paul & Sault Ste. Marie railways have lines extending across the southern part of the state and also a line from across the northern and central parts of the state and lines from Saint Paul and Minneapolis connecting therewith. The Chicago, Milwaukee & Saint Paul road has a line extending across the southern section and also a line from Minneapolis and Saint Paul across the south-central part, while the North Western system maintains a line between the two last mentioned. The Minneapolis & Saint Louis Railway maintains a line from the Twin Cities southwesterly to Omaha and another line westerly across the state and to the Missouri River. These, with the nu-

merous cross lines, now give ample railway facilities, with the exception of the far northern counties, which are still sparsely settled. Saint Paul and Minneapolis jointly form the great railway center, not only of Minnesota, but of the northern part of the Mississippi Valley. The total mileage is about 9,000.

The commerce of the state consists of the exportation of its surplus products and the importation of such articles as are not raised or manufactured within its borders. Minnesota is the leading state in the production of spring wheat, flour and iron ore, and these products are shipped in large quantities, the flour going to Europe as well as to American markets. Next in importance are products of the lumber industry, which are generally distributed over the surrounding states. Considerable lumber is also transported down the Great Lakes from Duluth and other ports on Lake Superior, and thus finds its way to eastern markets. Packing house and dairy products are important articles of export. The single item of importation of greatest value is coal, most of which is brought to Duluth by boat, whence it is distributed by the various lines of railway terminating at that port. Manufactured articles constitute most of the other imports. Saint Paul and Minneapolis constitute an important distributing point for the states to the West, and have a large wholesale trade. These conditions give Minnesota an extensive commerce.

Government. The legislature consists of a senate of sixty-three members, elected for four years, and a house of representatives of 119 members, elected for two years. The sessions are biennial, and are restricted to ninety days. The executive department of the government consists of a governor, a lieutenant-governor, a secretary of state, a treasurer and an attorney-general, elected for two years, and an auditor, elected for four years. The judiciary department consists of a supreme court of five judges, elected by the voters of the state, and two commissioners appointed by the court; and of district courts. Each county maintains a probate court, and townships have justices of the peace.

Education. The system of public schools is based upon the district plan, but is unified thoroughly. Education is compulsory up to the age of eighteen, and the illiteracy rate is only three per cent. At the head of the

Items of Interest on Minnesota

The greatest length of the state is 408 miles, the greatest width, 380 miles.

The rich soils of the Red River Valley were formed by the deposits of lake muds in a very large lake which existed at the close of the Glacial Period.

April is the month of ploughing and sowing for the Minnesota farmers, though the sowing of crops extends into May in the northern part of the state; under ordinary weather conditions the harvest begins about the end of August and continues through September.

When Minnesota was first settled the forested area was about 54,000 square miles and the prairie about 32,000 square miles.

The value of the farm lands of the state increased from \$788,000,000 in 1900, and to \$1,019,000,000 in 1910, and to over \$2,750,000,000 in 1920.

Minnesota ranks eleventh as an agricultural state with an annual crop worth over \$500,000,000, of which about 60 per cent is wheat and other cereals.

From 1900 to 1920 the value of the live stock rose from \$86,000,000 to \$300,000,000, the greatest increase being in the value of horses and mules.

The state has more than five thousand district schools, over two hundred high schools, five normal schools and the state university, one of the largest in the country.

Minneapolis, the largest city, is the greatest manufacturing center in the world for flour; the two largest flour mills in the world, making 12,000 and 10,000 barrels daily, are situated in Minneapolis, and about twenty other flour mills are operated by power furnished by the Falls of Saint Anthony.

Saint Paul, the smaller of the Twin Cities, and the capital of the state, with Minneapolis forms one of the greatest railroad centers in the Northwest. Its meat industry includes the largest plant in the Northwest; the manufactures of boots and shoes, saddles and harness, and furs are next in importance. More law books are

printed in this city than in any other city in North America.

Duluth, at the head of Lake Superior, ranks second only to New York among the ports of the United States in the volume of its tonnage; it is the great shipping center for iron ore. The United States Steel Corporation has erected here a ten million dollar plant.

The Mesaba Range, with Hibbing and Eveleth as the chief towns, produces more iron ore than any other mining center in the world. Original townsites were moved and reestablished so that valuable bodies of ore, discovered within the original town limits, might be mined.

Questions on Minnesota

How does Minnesota compare in area and population with Massachusetts? New York? California?

How many lakes are there in Minnesota?

What three important river systems drain the state?

What is the physical character of the northern part of the state? Of the southern?

What is the leading industry of Minnesota?

What is the most important crop? How does Minnesota rank as a producer of this crop?

What are the principal rocks quarried in the state?

What is the leading mineral products and how does Minnesota rank as its producer?

What is the principal manufacturing industry?

Name some other important manufactures.

What are the Twin Cities? For what are they famous?

What is the probable future of Duluth as a commercial center?

What are Minnesota's popular names?

To what did Longfellow refer when he spoke of the "mountains of the prairie"?

What is the leading forest tree in the state?

system is the University of Minnesota, at Minneapolis, which has organic connection with all of the high schools and through a system of examinations provides for the admission of graduates of these schools to the university. There is also an organic connection between the high schools and the graded schools and the ungraded schools of rural communities. The state superintendent of public instruction is at the head of the educational system; the schools of each county are under the supervision of a county superintendent. The school fund derived from the sale of school lands is very large, and is constantly growing. In addition to the aid received from this fund, each high school maintaining a course of study which prepares for admission to the university receives from the state an annual appropriation of \$1,000. Graded schools and country schools under certain conditions also receive direct state aid.

In connection with the school system is a system of public libraries, which provides libraries for all school districts that are willing to assume a portion of the expense. A thorough system of traveling libraries is also maintained. There are state teachers colleges at Winona, Mankato, Saint Cloud, Moorhead, Duluth and Bemidji. Other important institutions of learning, maintained by various denominations, are Carleton College at Northfield, St. Olaf College at Northfield, Hamline University at St. Paul, Macalester College at St. Paul, Gustavus Adolphus College at Saint Peter. There are also a number of large parochial schools and colleges in the state, under the management of the Roman Catholic Church.

Institutions. Hospitals for the insane are at Rochester, Saint Peter, Fergus Falls, Anoka and Hastings; schools for the deaf, the blind and the feeble-minded are at Faribault, and the state public school for dependent children is at Owatonna. The Mayo Clinic and associated hospitals at Rochester form a unique medical group of world-wide reputation. The penal institutions include the penitentiary at Stillwater, the reformatory at Saint Cloud, a training school for boys at Red Wing and one for girls at Sauk Center.

History. The territory of Minnesota was first visited in 1678 by a Frenchman, Duluth, who built a fort at the site of the city which now bears his name. Hennepin discovered

the Falls of Saint Anthony two years later, and within two decades settlement had begun in earnest. The region was ceded to Great Britain in 1763, was ceded to Spain in 1783, was retroceded to France in 1800 and was obtained by the United States through the Louisiana Purchase in 1803. The first permanent American settlement was a military post, Fort Snelling, established in 1819, but immigration and occupation practically began only after the treaty with the Dakotas in 1837, by which all of the Indian lands east of the Mississippi were ceded. In 1849 Minnesota became a territory, and it was admitted into the Union May 11, 1858, as the thirty-second state. Development was retarded by Sioux depredations, which culminated in a great massacre in 1862. When these conditions passed and a system of railways opened up the state, rapid growth was possible. In 1891 a compromise was reached on the important issue of the redeeming or repudiating bonds which had been issued to promote railroad construction. Much progressive legislation has been passed, including child-labor and minimum-wage laws, and a mothers' pension act. Laws have been passed for the promotion of tree planting on private lands of low farming value, and for reforestation of lands from which timber had been cut.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Duluth	Red River of the
Faribault	North
Hibbing	Red Wing
Lake of the Woods	Rochester
Mankato	Saint Cloud
Minneapolis	Saint Paul
Minnesota River	Stillwater
Mississippi River	Virginia
Rainy Lake	Winona

HISTORY

Hennepin,	Hiawatha	Louisiana
Louis		Purchase

MINNESOTA, UNIVERSITY OF, a state university, located at Minneapolis. It was established by an act of the territorial legislature in 1851, and was opened for instruction in 1869. The present organization embraces a college of science, literature and arts; a college of engineering and architecture; a department of agriculture, including forestry and home economics; a college of medicine and surgery, including a training school for nurses; schools of mining and analytical and applied chemistry; colleges of law, dentistry, pharmacy and education; an extension department; a school of business, and a graduate school.

The management of the university is vested in a board of trustees, of which the governor, the superintendent of public instruction and the president of the university are members *ex officio*. There are about 1,000 professors and instructors on the faculty, and the enrollment exceeds 11,000. The university libraries have about 450,000 volumes. The institution is coeducational, and over one-third of its students are women. The university is at the head of the public school system and maintains a thorough supervision over the high schools of the state by a system of inspection and examinations.

In 1915 the Mayo brothers, surgeons of Rochester, Minn., presented the university with an endowment fund of \$2,000,000. Since that year the medical department of the university has been affiliated with the Mayo Clinic at Rochester.

MINNESOTA RIVER, a river in the United States which rises in Big Stone Lake, flows through Minnesota and falls into the Mississippi about seven miles above Saint Paul. Its length is about 475 miles, and it is navigable for large steamboats for about fifty miles.

MIN'NOW, a popular name for any small fish. The roach, the golden shiner, the dace and a small carp are some of the fishes generally called minnows. They are the natural food of many larger fish and are generally used as bait for them.

MIN'OR, or **INFANT**, a term in law applied to persons who have not attained their majority, that is, the age of twenty-one years for a male and, in many states, eighteen years for a female, and are under guardianship. Being a minor is no bar to criminal proceedings; but young persons are not punished for offenses if they have not knowledge and discretion to distinguish them to be such. Minors require the consent of parents or guardians to marry. The jurisdiction in respect to them in matters of law is generally vested in probate courts. These courts appoint guardians to take charge of the property of minors, and, in case of the decease of both parents, to take charge of their persons; but during the life of the father he has the guardianship and control of the persons of his children until they are twenty-one years of age. In most states this power rests with the mother in case of the death of the father.

MINOR'CA, an island in the Mediterranean Sea, the second largest of the Balearic group (see **BALEARIC ISLES**), which belong to Spain. Its area is 293 square miles. The coast is irregular and for the most part steep, but there are a number of good harbors. The soil is not generally fertile, though considerable quantities of wheat, oil, wine, hemp, flax, oranges and lemons are produced. Iron, copper, lead and marble are plentiful. Port Mahon is the capital. Population, 1930, estimated, 42,000.

MINOR PROPHETS, **THE**, so called from the brevity of their writings, are twelve in number, namely, Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah and Malachi. Their prophecies are found in the Hebrew canon.

MINOS, in Greek legend, a king of Crete, the son of Zeus and Europa. According to one version of the legend he was a wise ruler who, after his death, was made a judge in the lower world. Other versions give less favorable accounts of his character and tell of his demanding from Athens young men and girls to be fed to the frightful Minotaur. See **MINOTAUR**.

MIN'OT'AU'R, in Greek mythology, a monster with the body of a man and the head of a bull, which fed on human flesh. Minos, king of Crete, kept this monster shut up in a vast labyrinth and fed him on youths and maidens who were sent each year from Athens as a tribute. Theseus killed the minotaur and freed Athens from the terrible curse. See **LABYRINTH**.

MINSK, **RUSSIA**, a capital of the province of the same name, on the Svislotch River, 430 miles southwest of Petrograd. It is the seat of a Greek archbishop and of a Roman Catholic bishop, and contains two castles. It has some manufactures, among which are leather, tobacco and agricultural implements, and it enjoys a considerable general trade. During the World War it was severely damaged by the invading Germans. Population, 1933, 180,900.

MIN'STREL, the name applied to a class of poet musicians who flourished at different times in the Middle Ages and afterward. The first minstrels were men who wandered from place to place exhibiting their talent in poetry and music by composing and reciting verses commemorating heroes and heroic

deeds. These verses were often set to simple music and sung to the accompaniment of the harp. The name is now given to a class of players who disguise themselves as negroes and combine music, comedy, juggling and pantomime and other simple forms of entertainment.

MINT, an institution for the legal manufacture and issue of metallic coins. In the Middle Ages it was customary for kings, churchmen, nobles and cities to make and issue coins, but the operation of mints is a prerogative of governments under modern conditions. As early as the eighth century B. C., gold and silver were minted in Lydia, a country of Asia Minor which possessed great mineral wealth. The Romans learned the art from the Greeks, and so developed it that they standardized the principle upon which modern coinage is based. Metallic coins were made in England before the Roman conquest, and in Anglo-Saxon days King Canute had an officer to supervise the coinage.

From the reign of William the Conqueror (1066), British coinage has had an uninterrupted history. In his time there were so many mints it was necessary to test the coins at intervals, as unscrupulous men sometimes tried to debase the money. In the next century supervision of coinage by specially appointed officials responsible to the king was introduced. Until 1850 the master of the mint received handsome fees in the form of deductions from the bullion sent in for coinage. The present Royal Mint on Tower Hill, London, was built in 1810. It is under the direction of the Chancellor of the Exchequer. Countries without minting facilities contract with foreign mints for the manufacture of their coins.

United States Mints. Before the Revolutionary War several of the colonies operated small mints, and some of the coinage of the period became famous. In 1792 a national coinage act brought all coinage under government control, conforming to a requirement of the new Constitution which placed upon Congress the duty of coining money and fixing the value thereof. The mint was established in Philadelphia, in 1792. In the same year copper money was coined; silver was coined two years later, and gold coins were made in 1795. The development of the country necessitated the establishment of other mints. At present there are two besides the

Philadelphia Mint, one at Denver and one at San Francisco. The mints and assay offices are under the supervision of the Director of the Mint, who is attached to the Treasury Department and appointed by the President. The assay offices are listed under ASSAYING.

In Other Countries. The Royal Mint at London supplies coins for such parts of the British Commonwealth and Empire as lack mints. Until 1931 the Royal Canadian Mint at Ottawa was a branch of the Royal Mint. There are branch mints at Perth and Melbourne, Australia; the branch at Sydney was closed in 1926. A branch mint at Bombay, India, has also been closed. The one at Pretoria was taken over by the government of the Union of South Africa in 1932. The Nationalist government of China began coinage at the new mint in Shanghai in 1933. Japan's one mint is in Osaka. The coins of several Latin American countries, including Cuba, Colombia, Honduras and Panama, are made by the United States mints.

Related Articles. Consult the following titles for additional information:

Assaying	Money
Bullion	Pine-Tree Shilling
Coining	Seigniorage

MINT, the common name of a large and important family of plants, described under the title LABIATAE.

MINTO, GILBERT JOHN MURRAY KYNYNMOND ELLIOT, Fourth Earl of, (1845-1914), a British soldier and statesman, educated at Eton and at Trinity College, Cambridge. He served with the Turks in 1877 in their war against Russia, and with Lord Roberts in the second Afghan War (1878-79). Later he was military secretary to Lord Lansdowne during his governor-generalship of Canada and was also chief of staff to General Middleton in the Riel rebellion. From 1898 to 1904 he was Governor-General of Canada and from 1905 to 1910 was Viceroy of India. (For portrait, see halftone group in the article CANADA.)

MINUET, an old-fashioned dance of French origin, characterized by slow, stately movements, graceful salutations and refined curtsies. Though founded on an old country dance, it became one of the most popular court dances during the reign of Louis XIV, and was in high favor in court circles in England for several reigns following the Restoration. In America the minuet was a favorite society dance in the colonial period, but is rarely seen now except upon the stage or at entertainments and costume balls.

Several famous musicians have composed minuet dance music, including Mozart, Bach, Handel and Paderewski.

MIN'UIT, or **MINNEWIT**, **PETER** (1580-1641), a governor of the New Netherlands under the Dutch West India Company (1625-1631). He purchased Manhattan Island and built Fort Amsterdam on the present site of New York City. He later laid the foundations of Fort Christopher (Wilmington) in Delaware, under the auspices of the South Company of Sweden.

MINUTE, *min'it*, a division of time and of angular measure. As a division of time it is the sixtieth part of an hour. As a division of angular measure it is the sixtieth part of a degree. See **LONGITUDE AND TIME**.

MINUTEMEN, *min'it men*, a term referring to New England Revolutionary patriots in American history who pledged themselves to be instantly ready to respond to a call to arms. The first enrollment of these men was in Massachusetts, following authorization by the provincial assembly in November, 1774.

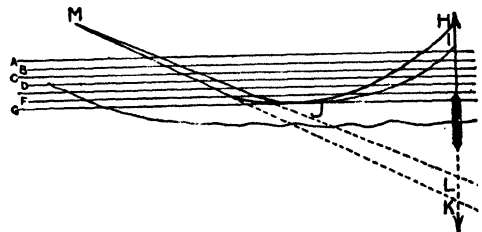
MIOCENE, *mi'o seen*, **PERIOD**, a division of geologic time, occurring between the Eocene and Pliocene periods in the Cenozoic Era (see **GEOLOGY**). The rocks formed in this period are found around the Gulf of Mexico and northward along the Atlantic coast to Martha's Vineyard. They include sandstone, shell marl, Bermuda earth and other polishing earths. Shales and sandstone of this period occur in California. The order of mammals to which man belongs first appeared in the Miocene Period.

MIRABEAU, *me ra bo'*, **GABRIEL HONORÉ RIQUETTI**, Count de (1749-1791), a French statesman and revolutionary leader. On the assembling of the States-General in 1789, Mirabeau, elected for Aix, soon became prominent. When the king required the third estate to vote apart from the other two orders, it was Mirabeau who counseled resistance, demanded the withdrawal of the troops, consolidated the National Assembly and defied the king's orders. As a practical statesman, Mirabeau desired action, and for this reason he attempted to form alliances with Lafayette, the Duke of Orleans, Necker and, finally, with the queen. In 1790 he became president of the Jacobin Club, and a year later was elected president of the National Assembly. Because of his fearlessness in championing popular rights he was often called "the tribune of the people."

MIRACLE, *mir'a k'l*, a term used in theology to denote a suspension of, or deviation from, the known laws of nature, brought about by the direct interference of a Supreme Being. It is an occurrence which is strange, marvelous, inexplicable, and it is usually connected with some moral purpose. Examples of Bible miracles are the supplying of manna while the Israelites were in the Wilderness; the fall of the walls of Jericho; the raising of Lazarus, the feeding of the 5,000 and Christ's resurrection.

MIRACLE PLAY, a form of drama which was in vogue in Europe in the Middle Ages. The miracle plays were based on episodes in the lives of the saints, and were originally performed in the churches as a part of the religious service. Later they were given by tradesmen's guilds in the market places and elsewhere. In England they were in greatest favor in the thirteenth century. There have been modern revivals of this form of religious play and of a similar form, the mystery (which see).

MIRAGE, *me rahzh'*, a phenomenon which may be described as the appearance of an object in the sky, when in reality, of course, it could not possibly be there. It is due to the reflection of rays of light by a layer of atmosphere of different density from that in which the object is situated (see **LIGHT**, subhead *Reflection of Light*). A mirage is an optical illusion, and is usually seen on deserts, where the intense heat of the land causes the layers of atmosphere near the ground to be much rarer than those above. In the figure, the rays *ABCDEFG*, striking the object *II*, are refracted downward, and they are not reflected back until they strike the surface of the layer *J*. This



acts like a mirror and reflects the rays to *I*. The observer at *M* sees the object at *L* and *K*; consequently, it appears inverted, as though it were reflected in a pool or lake. This illusion is very deceptive and often leads travelers to think that they are near

bodies of water when no water is present. Sometimes objects are seen inverted in the sky without any apparent cause. This is because some intervening object occurs between the observer and the object which produces the image. The most perfect mirage is produced when the sun is near the horizon, just at sunrise or sunset, since at those times the sun's rays are nearly horizontal and the refraction and reflection are nearly perfect. It is because of this that people living in valleys can often see the summits of mountains at morning or evening which are invisible during the remainder of the day.

MIRAMICHI, *mir a me she'*, a river of New Brunswick. It rises in two branches, flows in a general easterly direction and empties into Miramichi Bay. It is 135 miles from the headwaters of the largest tributary to the mouth of the main stream. The Miramichi is abundantly stocked with salmon, and its basin contains extensive forests in which wild game are found. The section is a sportsman's paradise.

MIRROR, a smooth surface capable of reflecting regularly a great proportion of the rays of light that fall upon it. In the ordinary sense, a mirror is a pane of glass coated on the back with an amalgam of mercury and tin. The mirrors used by the ancients were made of thin polished bronze, either set in a case or fitted with a handle. At a later period they used mirrors made of obsidian, a stone closely resembling black glass and capable of taking a high polish.

A *plane mirror* is one having a flat surface. Plane mirrors are those in common use in homes and public buildings. The image seen in a plane mirror is of the same size as the object and appears as far behind the mirror as the object is in front of it, but with the sides reversed. The right hand of your image when seen in a mirror is where your left hand would be were you facing in the same direction. The image seen by one observer is not that seen by another. In Fig. 1 let MN represent the

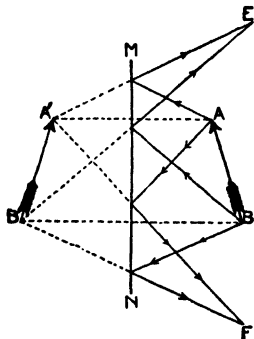


FIG. 1

mirror and E and F represent two observers. AB is the object and $A'B'$ the image. The observer at E can see the image in the direction of the rays EA' and EB' , while the observer at F would see the image in the direction FA' and FB' .

A *concave mirror*, like a lamp reflector, is a section of the inside of a hollow sphere. When parallel rays of light strike a concave mirror, they are reflected to a common point, called the *focus*. The focus is in front of the mirror and directly opposite its center. Concave mirrors show two kinds of images. When the object is farther away from the mirror than the point which would form the center of the sphere of which the mirror is a part, the image formed is inverted and smaller than the object. It appears on a screen in front of the mirror, as shown in Fig. 2. The rays of light from the object, AB , are reflected to a and b , while the rays Ab and Ba , which strike the mirror perpendicularly, are reflected back upon themselves. The rays Aa and Bb are reflected respectively at aA' and bB' . These reflected rays cross each other at F . The rays Ab and Ba cross at C . If the screen is placed at the point where these two sets of rays meet, it receives the image $A'B'$. If the screen is moved either toward the mirror or away from it, some of the reflected rays are lost and the image becomes indistinct. When the object is nearer the mirror than the center of the sphere of which the mirror forms a part, the image appears back of the mirror and is erect and magnified. This effect can easily be produced by using a common lamp reflector and holding the finger or some other object in front of it.

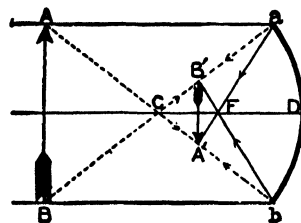


FIG. 2

A *convex mirror* is formed from the section of the outside of a sphere. The image formed by such a mirror is always seen back of the mirror and is erect and smaller than the object. Most hand mirrors are slightly convex. We notice that the image in such a mirror is distinct and considerably smaller than the object. A convex mirror transforms the image of a thin and tall person into one appearing short and very short. See **LIGHT**, subhead *Reflection of Light*.

MISDEMEANOR, *mis de meen'or*, an infraction of the law less serious in its nature than felony. Misdemeanors are punished by inflicting fines or short jail sentences. See **CRIME**; **FELONY**.

MISFEASANCE, *mis fé'sants*. See **MALFEASANCE**.

MISHAWAKA, *mish a waw'ka*, **IND.**, in Saint Joseph County, four miles east of South Bend, on the Saint Joseph River, and on the Grand Trunk, the New York Central, and two small industrial railroads. The various manufactures include trunks, machinery, agricultural implements, furniture, organs, and woolen and rubber footwear. It is one of the oldest towns in the state, having been settled in 1828. It was known as "Saint Joseph Iron Works" until the present name was given ten years later. There is a Carnegie Library, a Federal building, completed in 1915, and a hospital. Population, 1920, 15,195; in 1930, 23,630.

MIS'SAL, the book of the Roman Catholic Church containing the complete service for mass throughout the year. Pope Pius V in 1520 revised the missal and its use was required in all churches which could not show that their own service-book had been in uninterrupted use for 200 years. Clement VIII in 1604 and Urban in 1634 revised the missal, the latter revision being still in use. Slight modifications were made in 1884 and 1893 by Leo XIII.

MISSIONARY, *mish'un a ry*, **RIDGE**, **BATTLE OF**. See **CHATTANOOGA, BATTLES OF**; **CIVIL WAR IN AMERICA**.

MISSIONS AND MISSIONARIES. Missionaries devote their lives to the enlightenment and conversion of peoples, in the interest or under the auspices of some religion or religious organization. The first great Christian missionary was Saint John the Baptist, who preached the coming of Christ. Jesus commissioned his apostles to preach the gospel to all nations. They and their successors obeyed implicitly, and the result was the marvelous spread of the great religion, which soon had found its way over all parts of Europe.

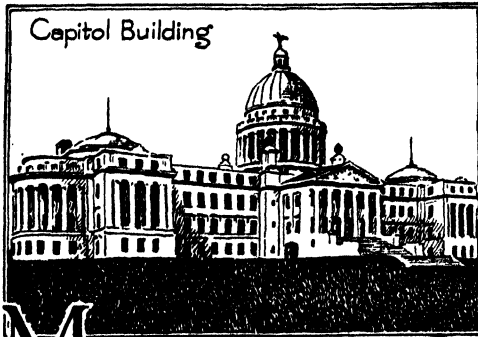
A new impulse was given to missions by the discovery of the New World. Almost every merchant ship that sailed for the West Indies, Mexico, Peru and Brazil was accompanied by zealous missionaries, eager to spread the Christian religion in the new lands. The powerful order of Jesuits turned their atten-

tion to the East, and the celebrated Francisco Xavier, a member of the order, met with remarkable success in India. Thence Christianity was introduced into Japan, from which, however, it was forced to retire, because of the terrible persecutions waged against its missionaries. Father Ricci, another Jesuit, succeeded by the end of the sixteenth century in establishing a foothold in Peking. Roman Catholic missions since the early part of the seventeenth century have been thoroughly organized and have spent enormous sums of money in carrying their religion into all parts of the world. The Catholics of the United States have, since 1884, helped materially in supporting the missions for Indians and negroes, besides contributing generously to the foreign fund. The most active missionary body is the Society of Jesus, or the Jesuits. It is estimated that there are now more than 60,000 Catholic workers, and that there is scarcely any part of the world not visited by them with considerable regularity.

Protestant Missions. The earliest Protestant foreign mission appears to have been one which was established by the French in Brazil in 1555. Shortly after the settlement of New England in 1620, John Eliot took a deep interest in the North American Indians, and in 1646 he began a regular mission among them. It was not, however, until the eighteenth century that the true missionary spirit became general. The English took the lead and were speedily followed by the Danes and, especially, the Moravian Germans. The missionary idea spread among the various Protestant denominations, and all of them now have societies which contribute workers and money annually. The total number of societies engaged in these missionary enterprises is over 550, and they are represented in the field by about 18,000 missionaries and nearly 100,000 native helpers. In modern times the missionaries have not confined themselves solely to the teaching of their religion, but have paved the way for it by the establishment of schools, the medical treatment of the sick and suffering natives and by teaching right methods of living to all whom they could interest.

Related Articles. Consult the following titles for additional information:

Augustine, Saint	Livingstone, David
Eliot, John	Marquette, Jacques
Grenfell, Wilfred T.	Patrick, Saint
Hennepin, Louis	Paul, Saint
Jesuits	Xavier, Francisco



MISSISSIPPI, *mis i sip'i*, once popularly called THE BAYOU STATE, now known as the MAGNOLIA STATE, is thirty-first in size among the states of the American Union, and the twenty-second in number of people. Its area is 46,865 square miles, and its population in 1930 was 2,009,821, of whom 1,009,000 were negroes. Illiteracy among all the people averages 13.1 per cent; among native whites alone, it is 2.7 per cent; among negroes, 23.2 per cent.

Surface and Drainage. The highest land is in the northern part of the state, where the greatest altitude is 602 feet. A low watershed, extending north and south, divides the state into two river basins—the eastern, which is drained into the Gulf of Mexico, and the western, drained into the Mississippi. This ridge is of rolling land broken into valleys, through which streams flow. To the east of the ridge the surface consists of rolling prairie. To the west of it the land slopes into the bottom lands of the Yazoo and the Mississippi. This low, level area of over 7,000 square miles, approximately one-sixth of the area of the state, is known as the Delta. Most of it has been reclaimed by the construction of levees, but disastrous floods broke through the levees early in April, 1927, covering a large part of the Delta for six weeks and causing great property loss. Since then a Federal program of flood control has given greater security to this most fertile part of Mississippi. See **LEVEE**.

The principal streams watering the eastern and southern parts of the state are the Tombigbee, Pearl and Pascagoula, all flowing into the Gulf. The chief tributaries of the Mississippi are the Yazoo, Big Black, Tallahatchie, Sunflower and Homochitto. There are no lakes except those directly con-

nected with the rivers. Drainage districts are rapidly being developed to reclaim the rich lands along the creek bottoms tributary to these streams.

Climate. Mississippi has a semi-tropical climate. The summers are long, but the intense heat which would otherwise prevail is tempered in the south by Gulf breezes. The thermometer seldom reaches 100°, while the mean for the summer is about 81°. The winters are short and mild, the mean temperature being about 45°. The Gulf coast is of exceeding beauty and is popular both as a winter and as a summer resort. The northern part of the state is much cooler in winter than the southern. In the north, ice usually forms and snow is not uncommon. The average rainfall is about fifty inches for the entire state, but it is much greater in the southern than in the northern part. The heaviest rains occur in late winter or early spring, and are caused by the meeting of the warm winds from the Gulf and the cold winds from the north. The rainfall is well distributed throughout the year.

Mineral Resources. The mineral resources are not abundant. Coal and limestone suitable for making hydraulic cement occur in the northeastern counties, gypsum is found in the central part, and clays and phosphate rock are quite generally distributed, though they are used only for local purposes. There is some lignite, and some prospecting for oil is being done. A small natural-gas field has been found in Monroe County, and in 1930 a larger field was found at Jackson.

Agriculture. Agriculture is the leading industry. The soil is highly fertile, and the climate is remarkably well suited to the production of all crops adapted to a semi-tropical and warm temperate climate. The bottom lands are especially fertile, suitable for the raising of sugar cane in the southern part and cotton, corn and hay in other regions. Cotton is the chief crop in point of value, and occupies fully one-half of the acreage planted (see **COTTON**). More than four million acres have been planted in this crop in one year, and more long staple cotton is produced in the Delta than in any other part of the United States. Among the cereals, corn is the most important, being planted on about half as many acres as cotton. About a quarter of a million bushels of oats are produced annually, as well as

smaller amounts of wheat and other grains. Quantities of hay, peas, sorghum, and potatoes, especially sweet potatoes, are raised, and in the southern section sugar cane, pecans, oranges, satsumas, figs and other fruits which grow in a semi-tropical climate. Since the exhaustion of the pine forests in parts of south Mississippi, truck farming and the raising of melons and berries for northern markets has become important.

Manufactures. Next to agriculture, lumbering is the most important industry in Mississippi. Soon after 1890 there began a large-scale cutting of the extensive yellow pine in the southern section and of the central and northern hardwood forests of oak, hickory, locust, and walnut. Only recently, lumber, timber, millwork and wood-preserving accounted for about half of the total value of all Mississippi manufactures (\$220,900,000). However, lumbering is declining in relative importance, for most of the virgin timber has been cut. In its stead Mississippians are turning to more extensive processing of the remaining timber, to reforestation, to truck-farming and to cattle-raising. The state is producing annually nearly ten million dollars worth of butter, cheese, ice cream, and condensed and evaporated milk. Cotton ginning is an important industry, and cotton seed oil, cake and meal is annually produced of the value of about thirty-nine million dollars.

Transportation and Commerce. The state contains about 4,400 miles of railway. Important trunk lines extend north and south through the eastern, central and western portions of the state. There are also lines crossing the northern, southern and central parts from east to west. All these are connected by cross lines, so the principal towns have railway communication. From north and east passenger and mail planes stop at Jackson. The Mississippi constitutes a waterway for the western counties.

Education. Separate public schools are maintained for white and colored pupils under the administration of a state board of education composed of the superintendent of education, the secretary of state and the attorney-general. County superintendents are elected by popular vote at the general elections. The state is well provided with higher educational institutions. In addition to the university (See MISSISSIPPI, UNIVERSITY OF), there is the Mississippi State Col-

lege at Starkville, which offers courses in science, agriculture, engineering and business, and also conducts several state experimental stations. Mississippi State College for Women, at Columbus, was the first state supported institution of higher learning exclusively for women founded in the United States. State Teachers College, at Hattiesburg, and Delta State Teachers College, at Cleveland, give special attention to the training of elementary teachers. Besides these, there are a number of denominational colleges: Blue Mountain College (Baptist), at Blue Mountain; Mississippi College (Baptist), at Clinton; Millsaps College (Methodist) and Belhaven College (Presbyterian) at Jackson; and Mississippi Woman's College (Baptist), at Hattiesburg. There is one state supported college for negroes, Alcorn Agricultural and Mechanical College.

The most significant trends in education are in the rural schools. In 1910 there were 4256 of these, mostly one-teacher schools. Since then many of these have been consolidated and pupils transported to them from a larger area at public cost. By 1930 the number of rural schools had decreased to less than 2,000, half of which were consolidated schools with excellent buildings, better equipment, and larger faculties. Since 1927 eleven state supported junior colleges have been created. In addition, there are denominational junior colleges supported by the Baptist, Methodist, Presbyterian, and Episcopal churches. The rural schools for negroes have not been consolidated as rapidly as those for white schools. Negro school teachers are trained at Alcorn College and at several privately financed institutions, the chief of which is Tugaloo College. A number of summer schools for negro teachers are maintained, five of which offer courses for college credit.

Institutions. The state schools for the deaf and dumb and for the blind are located in Jackson. At Columbia is an institution for the training of delinquent boys and girls. The school for the feeble minded is at Ellisville, and hospitals for the insane are at Meridian and Jackson. At Magee is located the state hospital for the tubercular, and several general hospitals at various points receive state aid. There is a Home for confederate soldiers and their wives at Beauvoir, the former estate of Jefferson Davis, on the Gulf Coast, near Biloxi.

Items of Interest on Mississippi

In addition to the mainland, Mississippi includes a number of islands, Ship, Horn, Cat, Petit Bois, and others, lying in the Mississippi Sound.

Most of the state lies in the Gulf Coastal Plain.

A feature of the surface is a strip of land between the Mississippi and the mouth of the Yazoo River, known as the Yazoo Delta; it extends from north to south about 175 miles and covers an area of 7,000 square miles; with the exception of a few flat ridges running from north to south, it is so low that it requires an unbroken line of levees fifteen feet high to protect it from overflows.

The coast line is eighty-five miles long.

Most of the rivers flowing into the Gulf are obstructed by sand bars and are navigable only during high-water from January to April.

The most fertile soil in the state is the alluvium of the delta, deposited during the overflows of the Mississippi; the black loam of the prairies and the silt of the bluff or hilly belt are also exceedingly productive; throughout the southern portion sand is a common element, while in the north there is more lime.

The prevailing winds are from the southeast, but the rain-bearing winds are generally from the southwest.

The Mississippi fisheries have never been important; the census report shows an actual decrease. This is partly due to natural causes, but more probably to a decision of the Supreme Court of the United States, by which the jurisdiction of the fishing grounds around Pear Island was transferred from Mississippi to Louisiana.

Oysters represent more than one-half of the fisheries' products, and shrimp nearly one-sixth of the total value.

Sugar cane and sorghum cane are grown to some extent, but not nearly as extensively as in Louisiana.

Sweet potatoes, white potatoes and onions are minor crops.

Grapes, limes, blackberries and straw-

berries are native, and in parts of the state are cultivated; horehound, ginger and mistletoe are also found.

Peaches and other orchard fruits are increasing in importance.

The finding of natural gas offsets the lack of coal, which has previously retarded manufacturing development. Lack of harbors retards commerce.

The total value of the factory product is about \$200,000,000 a year, of which more than three-fourths is represented by lumber and timber products, cotton goods, cottonseed oil and cake.

The improvements at Gulfport and Ship Island, which now has one of the best ports on the Gulf, have already had noticeable effects on commerce and industry.

Gulfport and Biloxi, the latter one of the oldest towns in the state, are important winter resorts.

That part of the Gulf of Mexico near the shore is called Mississippi Sound. It lies inside long, narrow and low islands a few miles off the shore.

Questions on Mississippi

How does the area of Mississippi compare with that of Alabama? Texas?

What part of the population is negro? Where are they most numerous?

In a general way describe the peculiarities of surface?

What is the length of the coast line?

Where is the principal airport?

Name five of the important rivers.

What portion of the total area is still timber land?

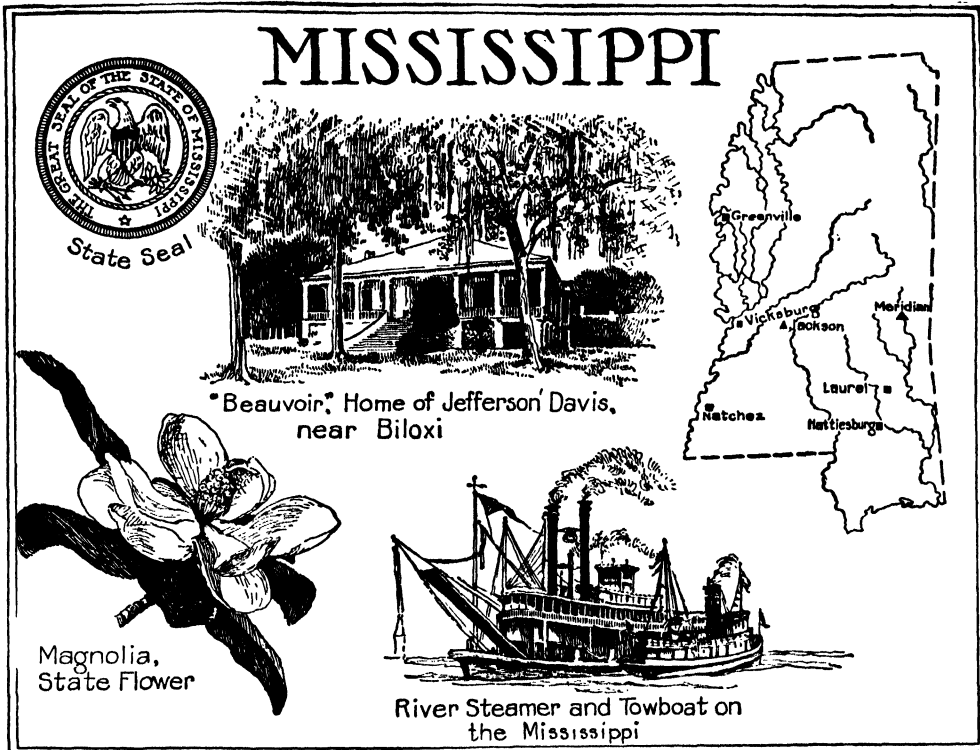
What are chief influences on the climate?

What is the principal product of the fisheries?

What is the principal crop? What can you say of the state as a cotton-producing region?

What is the relative importance of manufacturing and of agriculture?

What is the name of Jefferson Davis' old home? To what present excellent use is it put?



There is no state penitentiary. Prisoners are kept on state farms and worked under modern conditions by a state board.

Cities. There are thirteen cities in the state each having a population exceeding 10,000. The three largest are Jackson, Meridian, and Vicksburg, in the order named.

Government. The legislature consists of a senate of forty-nine members and a house of representatives of 141 members, the members of each being elected for four years. The regular sessions occur every two years, on the even-numbered years. The executive department consists of a governor, a lieutenant-governor, a secretary of state, an attorney-general, a treasurer and an auditor, each elected for four years. The first and the last two named cannot succeed themselves or one another. The state judiciary consists of a supreme court, composed of six judges, elected by the people for terms of eight years, and circuit judges and chancellors, who are also elected, for terms of four years. Applicants for registration for voting must be able to read the state constitution or show that he understands it when it is read to him.

History. The first European to pass through the region was the Spaniard De Soto, in 1541, but he left no settlements. La Salle took possession of the country in the name of France, in 1682. The first colony was established at Biloxi, in 1699, by d'Iberville. The territory did not prosper under French rule and was ceded to Great Britain in 1763. The colony flourished until 1781, when the southern part of it, known as West Florida, was subjugated by the Spanish. By the Treaty of 1783, the northern boundary of West Florida was placed at 31°, and a long dispute ensued until 1795, when Spain released its claim to territory north of that line. In 1798, the territory of Mississippi was organized; on December 10, 1817, it was admitted as a state. Jackson, the capital, was founded in 1821.

By treaties of 1830 and 1832 the lands of the Indians in the northern and central parts were ceded to the state and opened to settlement. In 1832 a new constitution was adopted. The state took radical ground against the anti-slavery cause, and adopted the ordinance of secession January 9, 1861. One month later Col. Jefferson Davis, who had

just resigned as Senator from Mississippi, was elected President of the Confederacy. In or on the borders of Mississippi were fought the battles of Shiloh, Corinth, Port Gibson, Vicksburg and other smaller engagements, and much of its best territory was devastated. During the reconstruction period, the state suffered severely from the extravagance and corruption of the government imposed upon it. It was readmitted to the Union in 1870, and white supremacy was restored five years later. A new state constitution was adopted in 1890. The initiative and referendum are in effect. Nine jurors may reach a civil verdict.

About forty miles of concrete sea-wall have been built to protect the Gulf coast. In 1930 a new state law code was adopted. Two years later a two per cent sales tax was imposed, and a system of tax administration was developed that has been copied by a number of other states. Mississippi was a pioneer in the sales tax. There are about 105 active wells in the Jackson gas field, with an open flow capacity of three and a half billion cubic feet a day.

Related Articles. Consult the following titles for additional information:

CITIES		
Biloxi	Hattiesburg	Meridian
Columbus	Jackson	Natchez
Greenville	Laurel	Vicksburg
RIVERS		
Mississippi	Tombigbee	Yazoo

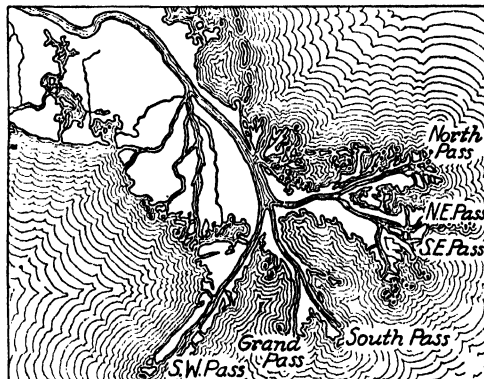
MISSISSIPPI, UNIVERSITY OF, a coeducational state institution, situated at Oxford. The university was opened in 1848, but during the Civil War work was suspended. The university consists of the college of liberal arts, the graduate school, and the following professional schools: law, engineering, education, medicine, pharmacy, and commerce and business administration. In addition, there are departments of music and extension and a summer session. The faculty is composed of 67 members, and about 1,300 students are enrolled. The libraries contain 60,000 volumes. The popular name of this university is "Ole Miss."

MISSISSIPPI RIVER, the greatest river of North America and one of the largest and most important in the world. The name was derived from an Indian term meaning *father of waters*. It was discovered by a Spaniard, De Soto; was once controlled by the French by reason of a settlement, New Orleans, in its lower course; and from 1783 to 1803 it formed the western boundary

of the United States. The stream flows almost across the country from north to south, is the natural entire eastern or western boundary line of six states and forms a considerable part of the boundaries of four other states. Its course runs over 400 miles east of the geographical center of the country.

Source and Course. Close to its source are many small glacial lakes. When Lake Itasca, in Northern Minnesota, was discovered in 1832 that body of water was declared to be the source of the Mississippi; this belief existed undisputed until 1910, when a geological survey of the entire region led to the decision that the source might as truly be Little Elk Lake, which empties into Itasca through Excelsior, or Elk, Creek, and Elk Lake.

After leaving Itasca Lake it flows southward through a number of lakes and over a series of rapids until it reaches the Falls of Saint Anthony, at Minneapolis. At Saint Paul is the head of navigation. Within the next 600 miles it receives the Wisconsin, the Iowa, the Illinois and the Missouri as tributaries. The Missouri is really the main stream, as its length, before the rivers unite, is much greater than that of the Mississippi before the junction. From Saint Louis, a little below their confluence, the Mississippi becomes a broad, rapid, muddy river, liable to overflow its banks. Lower down it receives in succession the Ohio, the Arkansas



DELTA OF THE MISSISSIPPI

and the Red rivers, and it finally enters the Gulf of Mexico through a large delta with several "passes," 110 miles below New Orleans.

The combined length of the Missouri and the Mississippi is about 4,200 miles; the

whole area drained is about 1,257,000 square miles. It is estimated that the volume of water discharged into the Gulf of Mexico is about 670,000 cubic feet per second. The Mississippi with its tributaries affords about 14,000 miles of navigable waterway. The volume of the river is usually smallest in October and greatest in April, and the low-lying lands are subject to damaging floods during the spring freshets. At many places attempts have been made to secure the river within its banks and to save the country from loss and suffering by building dikes, or *levees*. The sediment carried down, however, is continually raising the bed of the river, and thus breaks have been frequently made in these levees.

A Highway of Commerce. Before the advent of numerous railroads the great river was an important factor in the development of the middle west. "Life on the Mississippi" filled a romantic page in the country's history in the period of development before and after the Civil War, but later the stream declined in commercial importance. Only within recent years has the realization of this economic loss been brought prominently before the people. All waterways have taken on a new importance since on occasion railroads have been unable to meet all demands upon them, and especially is this true of the Mississippi. One of the greatest of all inland projects is that which looks to making seaports of all cities on its banks south of the mouth of the Illinois River and also the city of Chicago. This has been measurably accomplished by what is known as the Lakes-to-the-Gulf-Waterway, which has utilized for this purpose the Chicago Drainage Canal and the Illinois River. The course followed composes the Chicago River and the Drainage Canal, 36 miles to Lockport; the Des Plaines and upper section of the Illinois River to Starved Rock, 60 miles; and the lower section of the Illinois River, 231 miles, a total of 327 miles to its mouth.

Power Dams. The current of the river is from one to two and a half feet per second at low water; to utilize this natural power dams have been built at various places. The greatest of these is at Keokuk (described in an article relating to that city); the most northerly is at Bemidji, thirty-two miles below Lake Itasca, and others are at Grand Rapids and Brainerd. Between Brainerd and Minneapolis, 150 miles, in which dis-

tance the river falls 444 feet, there are six power dams. The Keokuk dam is arranged so there is no obstruction to navigation.

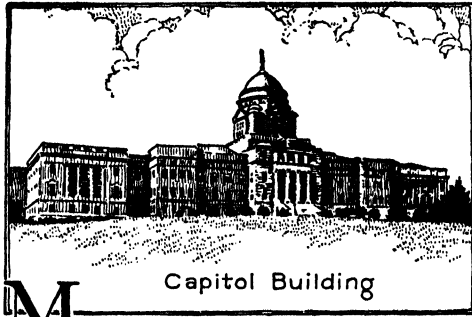
The Missouri-Mississippi System. Together the Missouri and the Mississippi rivers constitute the greatest river system in the world, with a length of about 4,200 miles—over 500 miles greater than that of the Nile and 900 miles longer than the Amazon.

Related Articles. Consult the following titles for additional information:

Delta	Jetty
Eads, James B.	Levee
Flood	Missouri River

MISSISSIPPI SCHEME, a financial scheme projected by John Law, a Scotsman, at Paris, in 1717. Part of the scheme was for the colonization and development of the Mississippi Valley, but combined with this there was a banking plan and a scheme for the management of the national debt, the whole being supported by the French government. Such were the hopes raised by this undertaking that the shares were sold at ten, twenty, thirty and even forty times their value. People came from all parts of France, and even from foreign countries, in order to invest in the company, and there was a general mania of speculation. The state took advantage of the popular frenzy to issue increased quantities of paper money, which was readily accepted by the public creditors of Law's company. The value of the paper money depreciated, and the shares fell in price. Law, the originator of the bankrupt company, fled from France, and the state acknowledged itself debtor to the shareholders.

MISSOULA, MONT., fourth in size among the cities of the state and the county seat of Missoula county, is 125 miles west of Helena, on the Hell Gate River and on the Northern Pacific and the Chicago, Milwaukee, Saint Paul & Pacific railroads. There is a large airport and also two landing fields. The city has a beautiful location in a region which by irrigation has been made exceedingly productive. Lumbering and mining are also carried on, and there are railroad shops, planing mills, flour mills and other works. It is the seat of the state university and has the Sacred Heart Academy and a business college. There are hospitals, a Carnegie Library and a Federal building. There is a large beet-sugar factory. Missoula was settled in 1864 and was incorporated in 1887. Population, 1920, 12,668; in 1930, 14,657.



MISSOURI, *mi soo'ri*, or *mi zoo'ri*, one of the states of the great Middle West, noted for its wealth of agricultural and mineral resources. Its popular name, **THE BULLION STATE**, is derived from the nickname of Senator Thomas Hart Benton, who was known as *Old Bullion* because of his interest in currency problems. Missouri lies in the heart of a rich agricultural district, with the Mississippi River a natural boundary on the east. Eight states adjoin it—Iowa on the north, Illinois, Kentucky and Tennessee on the east, Arkansas on the south, and Oklahoma, Kansas and Nebraska on the west. The state lies between the geographical center of the United States and its center of population.

Area and Population. With an area of 69,420 square miles, of which 693 square miles are water, Missouri is eighteenth in size among the states of the Union. It is between Oklahoma and Washington in area, exceeding the latter by only 300 square miles, and is about the size of all New England.

In 1920 the population was 3,404,055; according to the Federal census of 1930, it had increased to 3,629,367, giving it rank as the tenth state in population, with a density of 52.8 to the square mile, the United States average being 41.3. Missouri has over 224,000 negroes, and among residents of foreign birth Germans predominate.

Surface and Drainage. The Missouri River divides the state into two unequal sections. That portion north of the Missouri is mostly rolling prairie, diversified by occasional hills and valleys and containing growths of timber along the streams. The portion south of the Missouri is naturally divided into three physical regions—the western plain, which is continuous with the plains of Kansas and is undulating;

the Ozark Plateau, a region of elevated hilly or mountainous country, extending across the state from east to west and continuous with the Ozark Mountains in Arkansas and Oklahoma, and the lowlands in the southeastern part. This section contains much swampy land, and to make it available for farming a land reclamation act was passed in 1914, providing for its drainage. The Ozark Mountains are not very high, seldom exceeding 2,000 feet above sea level.

The principal rivers are the Mississippi, which borders the state on the east, and the Missouri, forming the upper part of the western boundary and then flowing across the state in a southeasterly direction to join the Mississippi a few miles north of Saint Louis. The chief tributaries of the Missouri from the north are the Platte, the Grand and the Chariton, while the Wyaconda and the Salt drain the northeastern portion directly into the Mississippi. South of the Missouri and flowing into it are the Osage, the Gasconade and the Lamine, while south of the Ozark Plateau and flowing into Arkansas are the White, the Black and the Current, which is a tributary of the Black. The Maramec rises in the heart of the Ozarks and flows easterly into the Mississippi. The Saint François drains the southeastern plain into the Mississippi and forms a portion of the western boundary.

Climate. Situated in the interior of the continent, midway between the northern and southern limits of the United States and too far from the oceans or the Great Lakes to be influenced by them, Missouri has a continental climate and suffers from extremes of heat and cold. The summers are hot, especially in the southeastern part of the state, where the thermometer often reaches 100°, or higher. The Ozark Plateau, however, has a fine climate. The northern portion has somewhat cooler summers and more severe winters. The average temperature for January ranges from 35° in the southeastern to 20° in the northern part; while the July temperature varies from 80° to 95°. The annual rainfall varies from about fifty inches in the southern counties to thirty-five inches in the north. This is irregularly distributed through the year, and in some sections droughts are frequent.

Mineral Resources. Missouri is one of the great mineral states, leading all the others in the production of zinc, lead, tripoli and

barytes. Lead is the most valuable mineral, and zinc is second. The production of these two minerals forms more than half the total mineral output of the state. The lead industry is centered in the southeastern part, particularly in Saint François and Madison counties, while the zinc deposits are chiefly in the southwest, in the vicinity of Joplin and Webb City. Coal mining is third in rank among the mineral industries. The coal deposits occupy a large portion of the state north and west of a line joining Springfield and Hannibal. These are a continuation of the coal fields of Kansas and Iowa. They give employment to about 10,000 miners, and have an average yield of nearly 4,000,000 tons. The Ozark Plateau also contains extensive beds of iron ore, which are most prominent in the vicinity of Iron Mountain and Pilot Knob. These are not thoroughly worked, because of high shipping expense. Granite, limestone, clay and other materials suitable for building purposes are widely distributed. Industries connected with clay are particularly important.

Agriculture. The northern, western and southeastern parts of the state have a deep, fertile soil and are especially suited to the growing of corn, grass, hay and other crops suitable for feeding stock. Corn is the leading cereal grown, and in its production Missouri is surpassed only by Illinois, Iowa and Nebraska. About 6,000,000 acres are planted to corn annually, and in average years the yield is 150,000,000 bushels. Wheat is second in importance. The average yield is approximately 17,000,000 bushels, and the grade is superior. Oats, sorghum, rye and potatoes are all raised in paying quantities.

The central section is given largely to stock raising and tobacco. On account of its fine blue grass it rivals Kentucky in high-grade horses. The Ozark region is devoted largely to fruit, poultry and dairying. Apples are generally grown throughout the state. In the extreme southeastern portion considerable attention is given to raising cotton. Throughout the state there are excellent grazing lands, and Missouri is one of the leading states of the Union in the production of live stock, especially mules, cattle and swine. The proximity of the state to the markets in Kansas City and Saint Joseph makes the fattening of cattle and hogs very profitable. Mules and blooded horses are largely exported to other states. Large numbers of

sheep are also raised, and the wool crop is important.

The forests contain a good deal of sycamore and red gum; the pine is nearly exhausted.

Manufactures. Because of its central location, its rail and steamship facilities and its accessibility to raw materials, Missouri has developed rapidly as a manufacturing state. It possesses in the city of Saint Louis the fourth manufacturing city of the Union, and in Kansas City a great meat-packing center, second only to Chicago. Slaughtering and meat packing is the leading manufacturing industry, and the making of boots and shoes is next in rank. Other industries, in order of importance, are the manufacture of flour and grist-mill products, printing and publishing, the manufacture of lumber products, foundry and machine shop work, clothing manufacture and coffee roasting. The making of smoking pipes has reached a high standard of excellence, and the state has also blast furnaces, glass works, potteries and paint factories. The average annual value of all manufactured products is in the neighborhood of one billion dollars.

Transportation. The northern half of Missouri is in the region traversed by the great trunk lines of railways, extending east and west across the country. Cross lines connect them and give this portion of the state ample railway facilities. Within recent years the Frisco System has built a great network of roads in South Missouri, with centers at Springfield and Cape Girardeau. The entire mileage of the state exceeds 9,300. Water communication with the Gulf and the ocean is provided by the Mississippi River. While the Missouri is navigable, the development of railways along its course has lessened its importance as a waterway. More than \$200,000,000 have been spent in the improvement of the state road system during a period of ten years.

Commerce. The commerce of the state is extensive. The exports are largely live stock, meats, lead, zinc, fruits and vegetables and numerous manufactured products, while the imports consist of food products and raw material for manufactures. Much of the commerce and transportation consists in the transit of commodities across the state from east to west, Saint Louis being one of the great distributing centers for the southwestern part of the United States. It has recently developed into a market of the first class for

horses and mules. Kansas City is a great market for agricultural implements and machinery.

Government. The legislature consists of a senate of thirty-four members elected for four years, and a house of representatives of 142 members, elected for two years. The sessions are held biennially and are practically limited to seventy days. The executive department consists of a governor, a lieutenant-governor, a secretary of state, an auditor, a treasurer, an attorney-general and a superintendent of public instruction, each elected for four years. The governor and the treasurer cannot succeed themselves. The courts consist of a supreme court of seven judges, elected for ten years, three district courts of appeal located at Saint Louis, Kansas City and Springfield, each having three judges elected for twelve years, and circuit courts, presided over by judges elected for six years. Each county has a probate and county court, and there are also justice courts in villages and towns. There are numerous important state boards, such as the equalization board and the public utilities board.

Missouri has enacted legislation providing for the initiative and referendum, nonpartisanship of judges, municipal home rule for cities of over 100,000 population, and the commission form of government for towns and cities desiring it. Juvenile courts are established in all counties. Capital punishment was abolished in 1917, but reinstated in 1919.

Education. The public school system is on the district plan. At the head of this system is the superintendent of public schools. The schools in the town are well graded, and the terms are long; many of the rural schools are graded, but have short terms. However, these schools are making steady progress towards a higher standard. There is a compulsory attendance law for pupils between the ages of six and fourteen. In 1931 the school laws of the state were revised providing a minimum term of eight months' school for all elementary schools, with state subsidies necessary to make this possible.

State teachers colleges are maintained at Warrensburg, Kirksville, Cape Girardeau, Springfield and Maryville. At Jefferson City is Lincoln University, for the training of colored teachers. The University of Missouri is located at Columbia; many of the high schools of the state are affiliated with it, and, through this arrangement, with other

universities as well. The other important universities are the Washington University at Saint Louis, a nonsectarian institution, and Saint Louis University, a Roman Catholic institution. A school of mines is at Rolla. There are numerous private coeducational colleges.

Institutions. The state school for the deaf and dumb is at Fulton, and the school for the blind is at Saint Louis. The hospitals for the insane are located at Farmington, Saint Joseph, Fulton and Nevada, and there is an institute for the feeble-minded at Marshall. The state tuberculosis sanatorium is located at Mount Vernon. A state prison is located at Jefferson City, a boys' reform school at Boonville and a girls' reform school at Chillicothe.

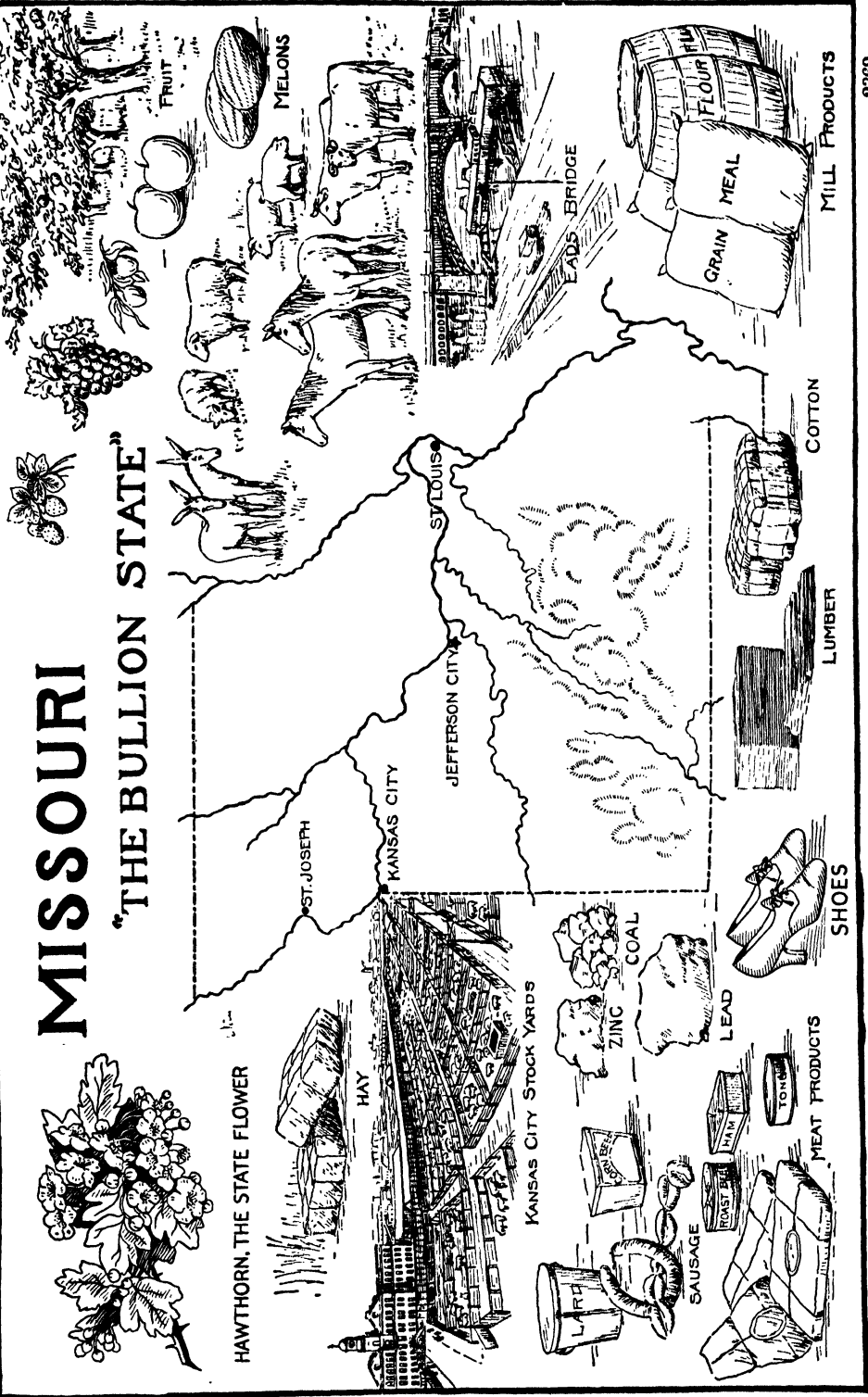
Cities. Missouri has sixteen cities with populations over 10,000. The first five, in order of size are Saint Louis, Kansas City, Saint Joseph, Springfield and Joplin. Jefferson City is the capital. Each is described in these volumes.

History. Missouri was explored in 1541 by Fernando De Soto, the Spanish adventurer. In 1673 Marquette and Joliet passed down the great river, and in 1682 La Salle took possession of the country in the name of Louis XIV. In 1719 the French began to explore the interior. The first permanent settlement was made at Sainte Genevieve, about 1735. The next settlement of any consequence was Saint Louis, founded by Pierre Laclede in 1764. By the Treaty of Paris in 1763, Missouri, together with all territory west of the Mississippi, was transferred to Spain, then ceded by Spain to France in 1800; it formed part of the Territory of Louisiana, purchased by the United States in 1803. In 1812 it was set apart as the Territory of Missouri. At that time there was a population of over 20,000, and the chief occupations were agriculture, fur trading and mining. In 1817 the territorial legislature applied to Congress for permission to prepare a state constitution, and on August 10, 1821, Missouri was admitted to the Union, after a long contest over slavery.

The first capital was Saint Charles, chosen in 1820, but Jefferson City became the permanent seat of government in 1826. Missouri soldiers engaged in several Indian Wars, notably in the Black Hawk War in 1832; the state troops also fought in the

MISSOURI

"THE BULLION STATE"



Items of Interest on Missouri

Missouri lies almost in the center of the Missouri Basin. Its length from north to south is 287 miles, and its average width, about 255 miles.

The Ozark Plateau, often called the Ozark Mountains, is not and never has been a mountain region; it is merely a low plateau, about 2,000 feet above sea level at the highest point, with valleys cut into it.

Missouri has more than one thousand miles of navigable waterways.

The prevailing winds are from the west or southwest; winds from the south and east are warm and moist; from the west and north they bring dry, clear, cool weather.

In number of mules Missouri leads all states except Texas, but in value it is exceeded by Texas and Georgia. Missouri mules and horses are noted as among the best in the United States.

The state is named for the river which flows across it. *Missouri* is the Indian word for *muddy water*.

The hawthorn is the state flower of Missouri.

Missouri leads all states west of the Mississippi in manufactures, and ranks tenth among all the states of the Union.

The enrollment in the public schools of Missouri is over 711,000, and there are nearly 24,000 teachers. About \$25,000,000 is expended in a year for educational purposes.

The Baptist, Methodist and Roman Catholic Churches are numerically the strongest religious bodies.

The Missouri Botanical Garden in Saint Louis is the finest institution of its kind in the United States. It was presented to the city by Mr. Henry Shaw.

The Mississippi River is rarely frozen over at Saint Louis. When it does freeze it is partly the effect of ice floating down from the north.

In 1914 the state constructed one of the largest hog serum establishments in the United States.

Over forty per cent of the total area of

the state is forested. The hardwoods of the Ozark district are the most valuable for lumber. In the southeast there are cypress swamps.

Hannibal was the boyhood home of Mark Twain. His old home is preserved by the city as a memorial; the cave mentioned in *Tom Sawyer*, which is located south of the city, is a place of great interest.

Missouri's favorite son, Champ Clark, was a candidate for the Democratic Presidential nomination in 1912. He was Speaker in the House of Representatives from 1913 until March, 1919.

The University of Missouri was the first institution in the world to organize a school of journalism, and its school of education was the first in any state university.

Questions on Missouri

Why is Missouri called "The Bullion State?"

Who was "Old Bullion"?

How does Missouri compare in size with the largest state in the Union?

How does its density of population compare with that of Rhode Island? Nevada?

How were the Ozark Mountains formed?

Describe the drainage system of the state.

How does the climate of Missouri differ from that of a seacoast or lake region?

What is a "continental climate"?

How does Missouri rank in the production of lead and zinc? Where are the chief deposits of these minerals?

What states surpass Missouri in the production of corn?

Name the chief manufactures.

What famous explorers visited the Missouri region in the sixteenth and seventeenth centuries?

What different nations have been in possession of what is now Missouri? In whose administration did it become United States territory?

What Missouri city is the location of a Federal Reserve Bank?

Florida War in 1837 and in the Mexican War in 1846. The people of Missouri were almost equally divided in sentiment on the slavery and secession question, and provided troops for both sides during the Civil War. The Union early in the struggle gained control of the state. Almost immediately after the close of the war, the state entered upon an era of wonderful prosperity. A world's fair was held at Saint Louis in 1904, celebrating the centennial of the Louisiana Purchase. In 1919 the state granted women the privilege of voting for Presidential electors.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY		
Cape Girardeau	Joplin	Saint Charles
Carthage	Kansas City	Saint Joseph
Columbia	Mississippi	Saint Louis
Hannibal	River	Sedalia
Independence	Moberly	Springfield
Iron Mountain	Ozark	Webb City
Jefferson City	Mountains	
HISTORY		
Civil War	Louisiana Purchase	
La Salle, Sieur de	Missouri Compromise	

MISSOURI, *miz zoó'ri*, an Indian tribe, reduced in 1823 to about eighty persons by the inroads of smallpox. The remnant joined the Oto, to whom they were related, and removed to a reservation in Oklahoma.

MISSOURI UNIVERSITY OF, a state institution of higher learning, founded at Columbia in 1839. It comprises a college of arts and sciences, a college of agriculture, an extension division, a graduate school and schools of journalism, education, commerce, engineering, law, medicine and mines and metallurgy. The school of mines and metallurgy is located at Rolla. Besides the campus and buildings the university owns a farm of about 800 acres. It was the first university in the world to organize a school of journalism. The regular enrollment is about 3,500, and the faculty numbers about 320. There is a library of 300,000 volumes.

MISSOURI COMPROMISE, the name given to an act of Congress, approved March 6, 1820, by which Missouri was admitted to the Union as a slave state, but slavery was forever prohibited north of the southern boundary of Missouri, namely 36° 30' north latitude. At the same time, but by a separate bill, Maine was admitted as a free state. The act was the outcome of a long period of discussion between the slavery and the anti-slavery parties. Up to that time the number of free and slave states had remained equal; therefore, the admission of Missouri as a free or a slave state would disturb this

equilibrium. Many bills were introduced by each party after 1819, and the bill as finally passed was the result of numerous amendments and resolutions. Its passage was largely due to the influence of Henry Clay, then Speaker of the House. In the following year another bill was passed, delaying the admission of Missouri to the Union until that state through its legislature had declared that no law would be passed which would abridge the rights guaranteed to all citizens by the Federal Constitution. This was to prevent the insertion of a proposed paragraph in the state constitution prohibiting the immigration of free negroes.

MISSOURI RIVER, a great river of the United States, generally regarded as the principal tributary of the Mississippi. In reality, it is the longer stream. Measuring from its source to the mouth of the Mississippi the Missouri is the longest river in the world. It is formed by the junction of the Jefferson, the Madison and the Gallatin rivers, which rise in the Rocky Mountains and unite near Gallatin City, Mont. After the junction of these three streams, the newly formed river flows first north, then east across Montana, and enters North Dakota, through which it flows in a curve southeast into South Dakota. After traversing South Dakota, it forms the northeastern boundary of Nebraska, and after a turn toward the south, it forms the dividing line of Nebraska from Iowa and Missouri. It flows between Kansas and Missouri as far as Kansas City, when it turns east and flows across Missouri to the Mississippi, which it enters twenty miles above Saint Louis.

From the source of the Jefferson, the longest of the three branches of which it is composed, to its mouth at the Mississippi, the Missouri River is 2,950 miles long, and with the Lower Mississippi it is 4,200 miles long. It is a swift and turbid stream. Its chief tributaries are the Yellowstone, the Cheyenne, the White, the James, the Big Sioux, the Platte, the Grand and the Osage, and the chief towns on its banks are Kansas City, Leavenworth, Atchison, Omaha, Council Bluffs, Sioux City, Pierre, Bismarck and Great Falls.

MIST. See Fog.

MISTLETOE, *mis' 'l to*, a parasitic, ever-green plant which grows on many trees, especially on the oak and the cypress. It is a bushy growth of yellowish-green twigs,

each bearing two rough, green leaves, with small, yellowish flowers between the leaves and at the forks of the stem. In the winter the plant is covered with small, soft white berries. Mistletoe is found in Europe and in the United States, but while the two plants are very similar in appearance, they are not closely related. In olden times the mistletoe was regarded by the Druids with great veneration. The priests gathered the plant only with a golden knife on the sixth day after the first new moon of each year and, dividing it with great ceremony, distributed it among the people, who wore it sacredly as a charm to keep off evil. It is still a favorite Christmas decoration, and in both Europe and America it is a playful custom to claim that a man has a right to kiss a woman whom he discovers under the mistletoe on Christmas eve.

MITCHELL, DONALD GRANT (1822-1908), an American author, better known as Ik Marvel. He was born at Norwich, Conn., received his education at Yale and after working for some years on a farm, traveled in Europe. For a time after his return he studied law, but soon gave up that profession and turned to literature. His most popular book, *Reveries of a Bachelor*, appeared in 1850. This was followed in 1851 by another representative book, *Dream Life*. In 1855 Mitchell settled down at "Edgewood," his farm near New Haven, Conn., and thereafter devoted himself to writing and to the rural activities he had always enjoyed. He published a number of books in which he preached the beauty and dignity of farming.

MITCHELL, JOHN (1869-1919), a labor leader, formerly president of the United Mine Workers of America. He was born in Will County, Illinois, received a limited education, later studied law and for a time was employed in Illinois coal fields. After 1885 he was closely connected with the labor union movement and after 1890 continuously held some office in the United Mine Workers of America. He was elected its president in 1899 and was continuously reelected for several years. From 1900 to 1914 he was one of the vice-presidents of the American Federation of Labor. During this period he was at various times a member of the state workmen's compensation board in New York, and in 1915 its chairman, and in the latter year became chairman of the New York state industrial commission. After

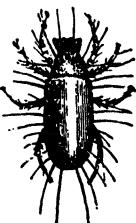
1917 he was president of the New York State food commission, chairman of the Federal food board for New York, president of the New York state council of farms and markets and a member of the Federal milk commission for the Eastern states.

MITCHELL, S. D., settled in 1881, is the county seat of Davison County, seventy miles west of Sioux Falls, on the James River and on the Chicago & Northwestern and the Chicago, Milwaukee, Saint Paul & Pacific railroad. The city is in a fertile region which produces wheat and live stock, and it contains a creamery, railroad and machine shops, grain elevators, brickyards, lumber yards and other establishments. It is the seat of Dakota Wesleyan University, and has a Carnegie Library, a Federal building, an Elks' Home and a large Catholic hospital. Population, 1920, 8,478; in 1930, 10,942.

MITCHELL, SILAS WEIR (1829-1914), a distinguished American physician, who achieved fame as a writer of essays and fiction. Doctor Mitchell's specialty was the treatment of nervous diseases. His "rest cure" system has been adopted generally for such treatment. He wrote essays voluminously on a great variety of medical topics, and published, among other medical books, *Injuries of Nerves and Their Consequences*; *Wear and Tear, or Hints for the Overworked*, and *Lectures on Diseases of the Nervous System, Especially in Women*. In general literature, Doctor Mitchell began as a writer for children, but soon met with even greater success with his finished essays and strongly written novels. *Characteristics*; *Circumstances*; *Doctor North and His Friends*; *The Adventures of Francois*; *Youth of Washington*. *Westways and Hugh Wynne, Free Quaker*, later volumes, are among the most popular. The last mentioned, a story of Washington and the Revolution, is generally considered his best.

MITES, small animals belonging to the same class as the spiders. Some are so small as to be invisible to the naked eye, while others are a half-inch long. Their mouths are fitted for boring and sucking the juices of the body they infest, for most of them are parasitic. Upon the body of the mite are scales, hairs or bristles of different forms, according to species. Some infest mammals, birds or animals of lower orders, and others feed upon plants. The spinning mites, or *red spiders*, as they are often called, leave a tiny thread

wherever they go, and when numerous they will cover a plant with a whitish mass. *Itch mites* burrow into the skin of man and other animals, and *gall mites* produce the peculiar formations seen on leaves and twigs of plants. While some mites destroy the eggs of injurious insects and so are beneficial, the majority of them are injurious, and some do decided damage, not only directly by their parasitism, but in some instances, also, by spreading disease.



MITE

MITHRIDATES, *mith ri da'teez*, (135-63 B. C.), king of Pontus, on the shore of the Black Sea. He received a Greek education, spoke twenty languages, and was regarded by the Romans as their most formidable adversary. He commenced his career of conquest soon after attaining his majority, and became master of nearly all of Asia Minor and of Greece. His supremacy in the East brought him in conflict with Rome, to whom he was forced by Sulla, with his outnumbering legions, to submit. After the death of Sulla, in 78 B. C. Mithridates levied an army with a determination to expel the Romans from Asia. But he was defeated by Lucullus, followed by the victorious Romans into his own states and driven to seek refuge in Armenia. In 67 B. C. he won a complete victory over the Romans; following up his success, he rapidly recovered the larger part of his dominions. The Romans then invested Pompey with absolute power in the East, and by his overwhelming numbers, in 66 B. C., the forces of Mithridates were completely routed near the Euphrates. The king retired beyond the Caucasus, and when his troops, headed by his son Pharnaces, marched against him, he killed himself.



MITHRIDATES

MIZPAH, a Hebrew name signifying *watchtower*, given to several places in Biblical literature. In a modern connection it is chiefly interesting as the name given to a heap of stones set up in Palestine by Jacob and his brethren as a sign that they invoked the watchfulness of God over the covenant between Jacob and Laban. For the

words of the covenant, "The Lord watch between me and thee," etc. (*Gen. XXXI, 49*), are implied in the word "Mizpah" as used to-day as an inscription for memorial rings.

MO'ABITES, the descendants of Moab, Lot's son, who occupied the fertile plateau lying east of the Dead Sea. They belonged to the same Semitic stock as the Hebrews and spoke practically the same language. They were numerous at the time the Israelites crossed their plains on the way from Egypt to Canaan. Moab and Israel were, throughout their history, mutually hostile and intermittently engaged in warfare. On becoming king of Israel, David, descendant of Ruth, a Moabitish woman, subjugated Moab. Later Moab was tributary to Assyria and Babylon and to Rome. After they were conquered by Nebuchadnezzar, the Moabites disappeared from history as a nation, though they continued to exist as a race.

MOABITE STONE, THE, a stone bearing an ancient inscription, found in 1868 by a German missionary in the country east of the Dead Sea. It is of black basaltic granite, about three feet five inches high, one foot nine inches in width and the same in thickness, with rounded top and straight base. The inscription, in thirty-four lines, dates from about 860 B. C. and is the oldest extant writing in the Hebrew-Phoenician language. It records the deeds of Mesha, king of Moab, and wars with Omri, king of Israel, and his successors. Unfortunately the stone was broken by native Arabs into numerous pieces before it could be transported, but it was repaired and now is in the Louvre, Paris.

MO'BERLY, Mo., in Randolph County, 125 miles northwest of Saint Louis, on the Wabash and the Missouri, Kansas & Texas railroads. The Wabash has division headquarters and shops here, and there are also brickyards, flour mills, a shoe factory, ice factories, foundries, machine shops, planing mills and other factories. The city is near deposits of coal and fire clay and has a valuable trade in farm and dairy produce. It contains the Saint Mary's Academy, a Carnegie Library, a Y. M. C. A. building, a Federal building and two hospitals. Population, 1920, 12,789; in 1930, 13,772, a gain of 7.7 per cent.

MOBILE, *mo bee'*, ALA., the state's only seaport and the county seat of Mobile County, on Mobile Bay, at the mouth of the Mobile River, twenty-six miles from the Gulf

of Mexico. It is on the Louisville & Nashville, the Southern, the Mobile & Ohio, the Alabama, Tennessee & Northern and the Gulf, Mobile & Northern railroads. Bates Field is the airport. In 1915 the Federal government completed the building of locks on the Warrior and Tombigbee rivers at a cost of \$11,000,000 to facilitate the river trade. The city contains the Academy of Visitation, Saint Mary's School, the Magill and Evangelical Lutheran institutes and Spring Hill College (Jesuit). There are numerous libraries, and the charitable institutions include the United States Marine Hospital, a city hospital, Providence Infirmary and several orphanages. Of the churches, the Cathedral of the Immaculate Conception is the most noteworthy building. Other prominent structures are the old courthouse, the tower, the Federal building, the Cotton Exchange and the Chamber of Commerce. There is a large export trade in cotton and cotton products, lumber, coal, live stock, fruits and naval stores. The manufactures include lumber and lumber products, foundry goods, flour, cotton products, tobacco products and brick. The cultivation and the shipping of vegetables are also important industries. The commission form of government is in operation.

The first settlement was made by the French in 1702, about twenty miles up the river. It was ceded to England as a part of West Florida in 1763, was captured by the Spaniards in 1780 and was given to the United States in 1814. In 1864 Admiral Farragut defeated the Confederate fleet in the bay of Mobile and compelled the surrender of forts Gaines and Morgan. The city itself passed into Union hands April 12, 1865. Population, 1920, 60,124; in 1930, 68,202, a gain of 12 per cent.

MOBILE BAY, BATTLE OF, a battle of the Civil War, fought August 5, 1864, between the Federal fleet under Rear Admiral David G. Farragut and a greatly inferior Confederate fleet, supported by land batteries. The entrance to Mobile Bay was protected by Fort Morgan and Fort Gaines, and it had also been blocked with torpedoes and piles, except for a narrow passage directly under the guns of Fort Morgan. Farragut directed the course of his fleet through this narrow passage, and at the same time he conducted a continuous bombardment of the forts. Being confronted by unforeseen obstructions,

Farragut was obliged to steer directly across the bay, which was thickly laid with torpedoes. Though these scraped the bottoms of the boats, only one exploded. A fierce battle ensued with the Confederate ram *Tennessee* and a few minor gunboats, and the Confederates were finally compelled to surrender. This exploit was one of the most daring of the war.

MOBILE RIVER, in Alabama, formed by the union of the Alabama and the Tombigbee, which unite about forty miles above the town of Mobile. The Mobile is navigable for large steamboats. It enters Mobile Bay by two mouths.

MOCCASIN FLOWER. See **LADY'S SLIPPER.**

MOC'CASIN SNAKE, a very venomous serpent, frequenting swamps in many of the warmer parts of North America. It is about two feet in length, is dark brown above and gray below. In the North, the copperhead is often called the moccasin.

MOCKING BIRD, a beautiful thrush, the sweetest of American feathered songsters. It has not only a charming song of its own, but such powers of mimicry that it can imitate the songs of other birds. The bird is about ten inches long, is gray above and white underneath. The wings and tail are nearly black and have white markings. The birds are numerous in the Southern states and in summer range as far north as Massachusetts. Their favorite habitat is the roadside, the meadow and the garden, but rarely the woods. They are favorite cage birds in Southern homes, where they have been taught to whistle many tunes. The nest is built near the ground of twigs, leaves, grasses, and soft roots. The eggs are pale greenish-blue, blotched with brown.



MOCKING BIRD

MODJESKA, *mo jes'ka* **HELENA** (1844-1909), a Polish actress, born at Cracow. At the age of seventeen she married Modrzejewski, a government official of Cracow, and when she went on the stage she abbreviated the name to Modjeska. After the death of her husband she married, in 1868, Count Bozenta

Chalpowski, and after 1876 made her home in the United States. She made tours through the United States and England in 1883, and again in 1889 and 1890, starring with Edwin Booth. Although she never used English with ease, her fine natural gifts gained for her a foremost rank as an actress of tragic rôles. Her favorite parts were Imogen, Beatrice, Juliet, Rosalind, Lady Macbeth, Camille, Mary Stuart and Cleopatra.

MO'DOC, a subdivision of the Klamath Indians. The women were skilful weavers, and the men were warlike and sold their captives as slaves to other tribes. After a series of conflicts with the whites, during which treachery was shown, the tragic end of the Modoc came in 1873. They had killed General Canby at a peace conference and retired to the lava beds, where, after a bitter fight, they were starved out and compelled to surrender. Only about 275 remain.

MOFFAT TUNNEL. See **TUNNEL**.

MO'GUL, a word with the same meaning as Mongol, but now applied specifically to the sovereigns of Delhi, who are called Great Moguls, or Grand Moguls. They are descendants of Baber, the Mongol conqueror who established an empire in Hindustan in 1526.

MO'HAIR, the hair of the Angora goat. The goats, originally confined to Asiatic Turkey, have been introduced into the United States, Australia, Africa and New Zealand. The typical mohair fiber is about seven inches long, is fine, soft and silky and usually pure white. At the annual spring clipping each animal yields from two to four pounds of wool. The alpacas and cashmeres made from this wool are light in weight, smooth and lustrous.

MOHAM'MED, or **MAHOM'ET** (about 570-632), the founder of Mohammedanism, or, more properly, Islamism. He was born in Mecca, Arabia, and, rendered an orphan by the death of his parents, was brought up by an uncle, Abu Talib, who educated him in business. When he was in his twenty-fifth year, a rich widow, named Khadija, engaged him as agent and eventually, though fifteen years his senior, married him. Mohammed had from his youth a propensity to religious contemplation, and each year retired to a mountain cave and lived for a time in solitude. At the age of forty he announced his belief that he had been called to divine service.

Abu Bekr, a man of high standing, persuaded ten of the leading citizens of Mecca to follow him. Mohammed instructed those who came to him in doctrines which purported to have been revealed to him by the angel Gabriel. He was persecuted, and his followers were few. A plot was set on foot to kill him, and, warned of the danger, Mohammed left Mecca, accompanied by Abu Bekr and his family and fled to Medina, where there were many converts. This migration, or *hegira*, as Mohammedans call it, occurred in the year A. D. 622, and from this date the Mohammedans reckon time. Many adherents of the new faith followed the leader to Medina, and from this time onward Mohammedanism spread rapidly. When the number of his followers had sufficiently increased, Mohammed resolved to make his doctrines compulsory with the sword. A long series of battles ensued. The whole of Arabia was conquered. Preparations for the conquest of Syria and for war with the Roman Empire were begun, when Mohammed died at Medina. He was a man of extraordinary insight, and he knew human nature; though he had almost no book learning, he was familiar with Bible narrative and with Eastern legends, and he possessed an elementary notion of what is fundamental in all religion. See **MOHAMMEDANISM**.

MOHAMMED V (1844-1918), a sultan of Turkey. He was a brother of Abdul Hamid, whom he was chosen to succeed in 1909 after the National Assembly had deposed that unscrupulous monarch. Mohammed, or Mehmet, as he was called, was kept in imprisonment thirty-three years by Abdul, who wanted his son, not his brother, to succeed him. Not until 1908, when a constitution was granted Turkey, was Mehmet allowed any freedom; and when, in the following year, he was called to the throne he was unfit to be more than a figure-head, a rôle he played throughout his reign, which saw the most critical period in Turkish history. In the course of those nine years Turkey became a German vassal; Italy took Tripoli; Turkey lost through the Balkan War most of its European possessions; in the World War it lost Arabia and Mesopotamia, and finally, its place as a power in the world.

MOHAMMEDAN ARCHITECTURE, the style adopted by the followers of Mohammed in building their mosques, palaces and tombs. The Arabs did not originate a distinctive

architectural style; the style which is identified with them was developed by their architects from styles in countries they conquered. Examples of this are seen in Egypt, Persia, Turkey, India and in Spain, where the order is called Moorish. Conspicuous features of Mohammedan or Sarassenic, architecture are the minaret and the pointed arch. The domes are sometimes in groups of three or more and are frequently enriched externally with colored tiles or other decorations. The minarets are slender towers of considerable height, rising in stages, or stories, each surrounded with a balcony, from which the muezzin summons the people to prayer. The arch is of the pointed variety, sometimes of the horseshoe form. Flat surfaces are freely ornamented with a profusion of scroll work and conventional foliage, often in intricate and beautiful designs, called arabesque. Stucco is much used in ornamentation, and brilliant coloring is especially characteristic. In Egypt Mohammedan art began with the mosque which Amru erected at Old Cairo, about A. D. 641. As repaired and altered, it may be considered as a good specimen of Moslem architectural art uninfluenced by Christian traditions. See ALHAMBRA; TAJ MAHAL; MOSQUE.

MOHAMMEDANISM, *mo ham'e dan iz'm*, the name commonly given in Christian countries to the religion established by Mohammed. The proper name of the religion is *Islam*, which means "entire submission to the will of God." The declaration of faith is, "There is no God but Allah, and Mohammed is his prophet." This religion embraces:

(1) Belief in God, who is without beginning or end, the sole Creator and Lord of the universe, having absolute power, knowledge, glory and perfection.

(2) Belief in His angels, who are sinless beings, created of light.

(3) Belief in good and evil Jinn (*genii*), who are created of smokeless fire and are subject to death.

(4) Belief in the Holy Scriptures, which are His uncreated word revealed to the prophets, and of which there now exist, but in a greatly corrupted form, the Pentateuch, the Psalms and the Gospels; and in an uncorrupted and incorruptible state the Koran, which takes the place of and surpasses all preceding revelations.

(5) Belief in God's prophets and apostles, the most distinguished of whom are Adam, Noah, Abraham, Moses, Jesus and Mohammed, Mohammed being the greatest of them all, the last of the prophets and the most excellent of the creatures of God.

(6) Belief in a general resurrection and final judgment and in future rewards and punishments, chiefly of a physical nature.

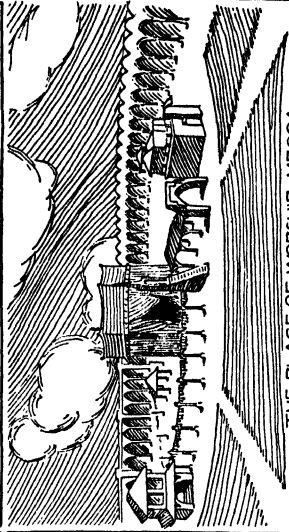
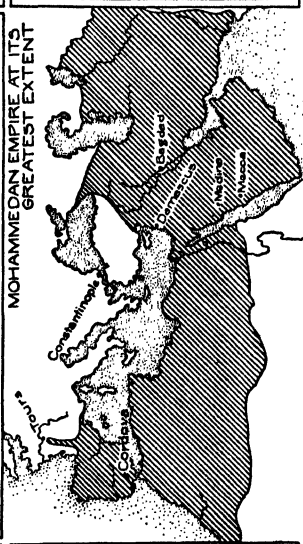
(7) The belief, even to the extent of fatalism, in God's absolute foreknowledge and predestination of all events, both good and evil.

The practical part of Mohammedanism teaches certain observances or duties, of which four are most important. The first is prayer, including preparatory purifications. At five stated periods each day, with his face turned in the direction of Mecca, the Moslem must offer up certain prayers held to be ordained by God, and others ordained by his prophet. Prayers may be said in any clean place, but on Friday they must be said in the mosque. Second in importance stands the duty of giving alms; next the duty of fasting. The Moslem must abstain from eating and drinking, and from every indulgence of the senses, every day during the month of Ramadan, from the first appearance of daybreak until sunset, unless physically incapacitated. The fourth important religious duty of the Moslem is making at least once in his life, if possible, the pilgrimage (*el-Hadj*) to Mecca, after which he becomes a Hadji. The distinctions of clean and unclean meats are nearly the same as in the Mosaic code. All intoxicating liquors are strictly forbidden. Music, games of chance and usury are condemned, so are portraits, both painted and carved. Charity, honesty in all transactions, truthfulness (except in a few cases) and modesty are indispensable virtues. After Mohammed's death Abu Bekr, his father-in-law, became his successor. Disputes then arose, a faction holding that Ali, the son-in-law of Mohammed, was by right entitled to be the prophet's successor. This led to the division of the Mohammedans into the two sects known as Shiites and Sunnites. The former, the believers in the right of Ali to be considered the first successor, constitute at present the majority of the Mussulmans of Persia and India; the latter, considered as the orthodox Mohammedans, are dominant in the Ottoman Empire, Arabia, Turkestan and Africa. The total number of Mohammedans to-day is estimated to be not far from 220,000,000.

MOHAVE, *mo hah'vay*, a tribe of Indians noted for their strength and fine physical proportions. They live on a reservation along the lower Colorado River in Northern Arizona, where they build log houses of

MOHAMMEDANISM

MOHAMMEDAN EMPIRE AT ITS
GREATEST EXTENT



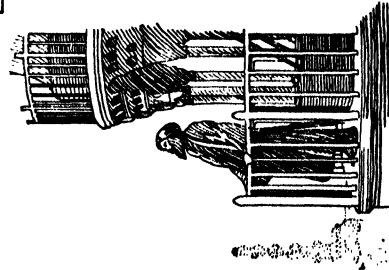
THE PLACE OF WORSHIP, MECCA

Chronological Summary

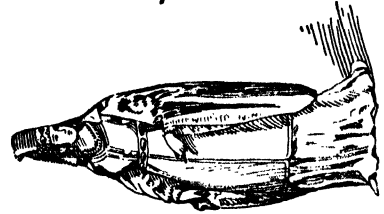
Birth of Mohammed.	570
The Hegira.	622
The Return to Mecca.	630
Death of Mohammed.	632
Omar Captures Jerusalem.	637
Saracens Conquer Africa and enter Spain.	711
Saracens Repulsed at Constantinople.	717
Saracens Repulsed at Tours.	732
End of Mohammedan Expansion.	750
Harun-al-Raschid, Caliph.	786



AN ARAB WARRIOR



THE MUZZIN
(CALL TO PRAYER)



ARABIAN WOMAN
TIME OF MOHAMMED

مَوْصِيَّةُ الْبَنَاتِ الْخَيْرِ

حَقِّطْ نَوَافِلَ مَقُولِ

FROM AN OLD MANUSCRIPT OF
THE KORAN



MOHAMMED'S SIGNATURE

H. M. HAINES.

brushwood covered with sand, and raise corn, pumpkins, melons and beans. They make fine pottery and excellent baskets. The Mohaves are a reticent, slow, contented tribe, adhering closely to their old manners and customs. They tattoo themselves and cremate their dead.

MO'HAWK, the chief tribe of the Five Nations, or Iroquoian confederacy, which formerly lived in the lower valley of the Mohawk River. They were among the earliest Indians to meet the Dutch and French settlers and soon secured firearms from the former. Armed with these weapons, they became a tremendous power in the confederacy, but their position brought them quickly into conflict with the whites, by whom they were repeatedly defeated in battle. During the Revolution they sided with the British until, under Brant, they were driven into Canada, where they now live principally as farmers in Ontario. See FIVE NATIONS, THE; IROQUOIAN INDIANS.

MOHAWK, a river of the United States, the principal tributary of the Hudson in the state of New York. It rises in Lewis County, flows in a southeasterly direction and into the Hudson at Cohoes. Its length is about 160 miles. It affords abundant water power and flows through beautiful scenery.

MOHE'GAN, an Algonquian tribe closely related to the Mohicans of New York (see MOHICAN). They lived in Connecticut along the Thames River. The Pequot were a branch of the Mohegan, but at the time of the Pequot War, the Mohegan sided with the whites, to whom they gradually lost their power, and they have disappeared or become mixed with negroes and low whites.

MOHICAN, *mo he'kan*, a powerful Algonquian tribe, pictured with vividness in Cooper's *Last of the Mohicans*. They lived in New York along the Hudson, where they waged fierce warfare with the Mohawks. Today they are represented by a small group known as the Stockbridge Indians, who live upon a reservation near Green Bay, Wis. The Mohicans were strong and well-built and considerably advanced in civilization.

MOKI, *mo'ke*. See HOPi.

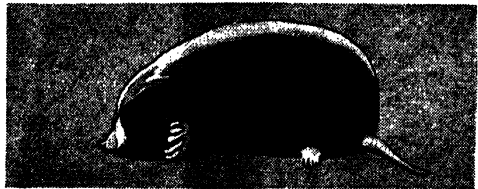
MOLAS'SES, a thick, dark-colored syrup, obtained in the manufacture of sugar. Several varieties are known to the trade, such as *West India*, *New Orleans*, *golden drip* and *sugar house*. The last named is the product of refineries, and is separated from the sugar

in the drying machines. Molasses is used in some localities as a substitute for sugar. It also enters into the manufacture of rum. See SUGAR.

MOLD, minute vegetable growth of a low type, especially such vegetable organisms as appear on articles of food when neglected and on decaying substances. It is the slight furlike, almost cobwebby substance so frequently seen on bread and other vegetable products. Mold starts from a small particle called a spore. This swells and bursts, sending out hairlike threads, which develop into a minute spore case, in which many thousands of spores appear. In this way molds multiply. Molds will not develop where the air is very dry, nor where the air is cold.

MOLDING, in architecture, a term applied to a non-structural architectural detail employed to refine the contour of various parts of a building. Moldings occur as grooved or ornamental strips on cornices, door facings and window jambs, as encircling embellishments of capitals and bases. The Greeks were the first to appreciate the value of molding as an architectural finish, and they were masters in the use of it. In vast interiors the splendor of the architectural effect is much enhanced by the ripple of light and shade made possible by the alternate concave and convex surfaces of the plain moldings or by the regular and rhythmically recurring patterns distinguishing those of another type.

MOLE, a little animal which, in its search for worms or larvae, burrows just under the surface of the ground, thus pushing up the



MOLE

earth in little ridges. The common mole is found in America from Canada to Florida and all over Europe, except in the extreme south and north. It is five or six inches long and has a large head. It has no external ears, but, contrary to popular belief, has eyes, though very minute ones, which are almost concealed by soft, short fur. The animal's strong, slender snout and short sturdy front

legs are well adapted to its manner of life. the male builds an underground house of many chambers, from which runways extend in all directions.

There are several species of moles in North America. One has a star- or fringelike arrangement of the cartilages about the nose, and for this reason it is called the *star-nosed mole*. There are no moles in the tropics, South America or Africa, though certain other burrowing insectivorous animals, sometimes called moles, are found there.

MOLE CRICKET, a large cricket whose front legs resemble somewhat the front legs of a mole and whose habits are similar to those of the latter animal. The common brown mole cricket of the United States is about one and a half inches long. As in its burrowings it often bores through the roots of plants, it sometimes devastates gardens. A larger species is found in South America.

MOLECULE, *mol'e kule*, a chemical term referring to the smallest particle, or unit, into which any substance can be divided without losing its identity. A drop of the compound called water contains countless molecules, each of which is a particle of water, and this particle, when no further division is possible, is a molecule. When it is broken up into its elements, or decomposed, it ceases to be water, but is found to be composed of two parts of hydrogen and one part oxygen—or, scientifically stated, two atoms of hydrogen and one atom of oxygen. This accounts for the symbol H_2O , the chemical formula for water.

Molecules, then, are composed of atoms. Any change in the proportionate number of atoms in a molecule changes the physical character of the molecule and therefore creates a change in the physical substance. For illustration, if there are three atoms of hydrogen and one atom of nitrogen in a molecule, that molecule is a particle of ammonia. In dealing with molecules the scientist is dealing with particles infinitely smaller than the most minute germ ever studied through the microscope of the biologist. But the fact that a molecule cannot be seen does not throw doubt upon its reality. Countless experiments attest the truth of our belief in the reality of the molecule, and the philosophy of modern science is based upon that belief. See **ATOM**; **CHEMISTRY**.

Molecular Forces are the forces which bind together the atoms into molecules and which

regulate the relations of the molecules themselves, so that the body made up of them assumes the solid, liquid or gaseous state.

Molecular Weights. Individual molecules are too small to be weighed. There is a well-known scientific law, first formulated by the Italian scientist, Amadeo Avogadro, which states that equal volumes of all gases under the same conditions of temperature and pressure contain the same number of molecules. If two such volumes of gas are weighed, we may find the relative weights of their molecules. It is customary to adopt some standard as the unit of measurement, such as 2 for hydrogen and 32 for oxygen.

MOLIERE, *mol'hyair'*, (1622-1673), the assumed name of JEAN BAPTISTE POQUELIN, the greatest of French dramatists. His father was a tradesman connected with the court, and the son received a good education. When the father became unable to perform his duties, the son took the position, but gave it up for the career of actor, assuming the name by which posterity knows him. After achieving success in the provinces with *The Madcap*, *The Loving Spite* and other plays, he settled in Paris in 1658. In the following year his reputation was enhanced by the production of *The Absurd Precieuses*, a delicate satire on the prevailing language, thought and dress. Continuing to produce new plays and performing the chief comic parts himself, he became a favorite, both with court and people, though his enemies—rival actors and authors—were numerous. Louis XIV was so well pleased with the performances of Molière's company that he attached it to the court and gave its owner a pension. In 1662 Molière made an unfortunate marriage with Armande Béjart, an actress twenty years younger than himself, and this union embittered the latter part of his life.

Among his works, other than those mentioned, may be noted *The School for Husbands*, *The School for Wives*, *Don Juan*, *The Misanthrope*, *Tartuffe*, *Physician in Spite of Himself*, *The Miser*, *Scapin's Knaveries* and *The Imaginary Invalid*. Molière died of apoplectic stroke, a few hours after playing in *The Imaginary Invalid*. Public burial was forbidden by the archbishop of Paris, on the grounds that Molière was an actor and a reviler of the clergy; but his body was laid in Saint Joseph's churchyard. A century after his death the French Academy set up in their hall a bust of him with

the inscription "Nothing is lacking to his glory; he is lacking to ours." As a player he was unsurpassed in high comic parts; and in the literature of comedy his name is, after Shakespeare's, the greatest among the moderns. He borrowed freely from Latin, Spanish and Italian writers, but whatever materials he appropriated he so treated them as to make the result entirely his own.

MOLINE, *mo leen'*, ILL., founded in 1829, is in Rock Island County, adjoining Rock Island, on the Mississippi River, and Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy and the Chicago, Milwaukee, Saint Paul & Pacific railroads. Moline, East Moline, Rock Island, and Davenport, Iowa, form a great "quad-city" municipality of more than 140,000 people. Coal is mined in the vicinity. The principal manufactures include one of the greatest plow works in the world, a branch of one of the greatest harvester works found anywhere, and nearly 90 other manufacturing establishments. A great bridge spans the Mississippi. The city has a Federal building, a Carnegie Library and three hospitals. The commission form of government was adopted in 1911, but abandoned in 1919 in favor of mayor and council. Population, 1930, 32,236.

MOLLUSCA, *mah lus'ka*, a large family of soft-bodied animals, most of which live in shells. It includes oysters, mussels, clams, snails, slugs, barnacles, cuttle-fish and innumerable other forms. Of the 20,000 species, some live on dry land, others in streams and still others on the sea coasts or in the ocean depths. Some of them are capable of burrowing (notably clams), others of swimming, while still others crawl or skip over the sand, and some, among them, oysters and mussels, are fixed and stationary. Many are vegetarians, while others feed on an animal diet. Yet, notwithstanding their very wide range of shape and habit, they possess in common many structural details. The mollusca are invertebrates (they have no backbones); they have no jointed legs or arms, and they are commonly covered with a hard shell of one, two or more parts. Although some are like worms in appearance, the bodies of these species are not made up of rings or sections. Most of them have heads and some have eyes, but the eyesight is very poor. The eyes of the land snails are at the end of long tentacles, which protrude from the shell as the animal moves about.

The mollusk has a respiratory system, certain species breathing by means of hairlike processes near the mouth, others through gills. It has a heart and a circulation of colorless blood. There is a ladderlike nervous system on the under side and a well-defined alimentary canal, the latter consisting of mouth, gullet, stomach and intestine. Many of these animals, snails among them, have a sort of "foot," or creeping disk, by means of which they go about. The clam has a tongue-shaped projection by means of which it burrows into sand or mud, and the mussel, an equally useful equipment by means of which it plows its way into the water bed. A large part of the mollusk forms what is called the mantle, which secretes the substance forming the shell.

Mollusks inhabiting single shells, such as snails, are called *univalves*; those with double shells, such as oysters and clams, are *bivalves*. Bivalve shells are held together at one side by a strong hinge made flexible with a ligament. Univalve shells are shaped either like a cup or like a cone wound spirally around an imaginary axis. The shells occur in an almost limitless number of forms, some of which are exceedingly delicate, beautiful in shape and marvelous in color. Many are very small. Outside the shells are rough; inside, the walls are of the smoothness of satin, and many are lined with an iridescent coat of pearl.

Related Articles. Consult the following titles for additional information:

Argonaut	Limpet	Scallop
Chitons	Mussel	Sea Squirts
Clam	Nautilus	Slug
Conch	Octopus	Snail
Cuttlefish	Oyster	Squid

MOLOKAI, *mo lo ki'*, a notable leper island of the Hawaiian group, somewhat over 260 square miles in area. All persons on the islands found to be affected with the disease are sent by the government to Molokai and are kept entirely isolated from the healthy part of the community. Population 1930, 5,000. See LEPROSY.

MOLTING, the act or process by which birds renew their plumage, snakes and many insects their skins, many animals their hair and deer their antlers. Some animals experience a complete change of this kind once each year; a few have a principal molt and an incomplete one in that period. By it old tissues are discarded and new ones are attained; light summer protection is reinforced to meet the cold of winter, and in spring

cast off for the warm season; skin is shed by insects in the process of metamorphosis (which see).

In nearly all instances the process is so gradual that the animals experience no serious inconvenience during the molting season; that there is a physical effect, however, is known from the fact that, while molting, most canaries will not sing, some wild animals become quarrelsome, and in others a lassitude prevails. The height of the molting period in temperate latitudes is in August or early September for birds, though males have a spring molting preceding the mating season, and in early spring for animals with hair. Caterpillars usually molt five times before they enter the pupa stage.

MOLTKE, **HELMUTH CARL BERNHARD**, Count von (1800-1891), a Prussian general. He entered the Danish army in 1819, left that service for the Prussian three years later and became a member of the general staff in 1833. In 1835 he spent some time on travel through Southeastern Europe. With the consent of his own government, he remained in Turkey to assist the sultan, Mahmud II, in carrying out far-reaching military reforms. In 1838 Moltke accompanied the Turkish army to Syria to supervise the campaign against Mehemet Ali, Turkish viceroy of Egypt. His advice being ignored, he returned to Prussia in 1839. During the next two decades he rose steadily in rank and influence, was promoted to major-general in 1856, and appointed chief of the general staff in 1857. He directed his efforts toward making the army and its officers more efficient, while his genius as a strategist was revealed in the conduct of the Seven Weeks' War between Austria and Prussia (1866) and the Franco-German War of 1870-1871. Moltke was created a count in 1870, and in 1871 was awarded the title of field marshal.

Helmuth Johannes Ludwig von Moltke (1848-1915), a nephew of the famous field marshal, was born in Mecklenburg-Schwerin. He served in the Franco-German War, and was an adjutant under the elder Moltke. In 1906 he was appointed chief of the general staff and general of infantry. Early in the World War General von Moltke failed to achieve the supreme purpose of Germany, the capture of Paris, and after the Battle of the Marne he was superseded by General von Falkenhayn. See **WORLD WAR**.

MOLUC'CAS, or **SPICE ISLANDS**, a name applied to the widely scattered group in the Malay Archipelago lying between Celebes and Papua. The combined area of the islands is 30,168 square miles, excluding the island of New Guinea, part of which is Dutch. The southern part is governed directly by the Dutch, while the northern is ruled through native sultans. The islands are nearly all mountainous and mostly volcanic, and earthquakes are common. Nutmegs, cloves, cocoanuts, mace and sago are exported. Population, 1930, 893,000.

MOLYBDENUM, *mo lib'de num*, or *mo lib de'num*, one of the metallic elements, silvery white in color, with a metallic luster. It is second in hardness to iridium among pure metals, is brittle, and not easily fused. It does not occur in the native state; its principal ore is molybdenite, found in various parts of the United States in ample quantities for domestic needs. The most important use of the element is its employment in hard-steel alloys for use in automobile parts, high-speed tools, agricultural implements, permanent magnets and railway forgings and bolts. Metallic molybdenum is employed as the supporting wire of incandescent-lamp filaments, in X-ray apparatus and for electrical resistance furnaces. Chromium steel containing molybdenum is used in the construction of airplane fuselage.

MOMENTUM, the quantity of motion possessed by a moving body. Momentum equals the mass multiplied by the velocity. A stone weighing 200 pounds and moving 20 feet per second will have a momentum of 20 times 200 pounds, or 4,000 pounds. The unit quantity of momentum most commonly employed is that possessed by a body of the mass of 1 pound, moving with a velocity of 1 foot per second. The C. G. S. (centimeter-gram-second) unit is the momentum possessed by a body of one gram mass, and one centimeter per second velocity.

MOMMSEN, *mohm'zen*, **THEODORE** (1817-1903), a celebrated German historian and archaeologist. In 1852 he became professor of Roman law at the University of Zürich, and two years later he was given a similar position at the University of Breslau. He went to Berlin in 1858 as professor of ancient history and remained there until his death. In the Prussian parliament, of which he was a member from 1873 to 1882, he was an advocate of liberal movements and an

opponent of much of Bismarck's policy. Mommsen's *Roman History* is one of the most notable contributions ever made to history.

MOMUS, in classical mythology, the god of mockery and censure, who was expelled from heaven for his free criticism of the gods. Momus is generally represented raising a mask from his face and holding a small figure in his hand. His mother was Nox, goddess of night.

MONACHISM, *mon'a kiz'm*. See MONASTICISM.

MONACO, *mon'a ko*, excepting Vatican City the smallest independent principality in the world, with an area of eight square miles, at the extreme southeast of France, less than five miles from the Italian border. It is Italian in tradition, but French in language, and since 1860 has been under the protection of the French government.

There is little of Monaco except the capital, Monaco, the famous Monte Carlo, center of the world's interest in gambling, and the village of Condamine (population about 11,050). The town of Monaco is situated on a rocky height projecting into the sea and is a renowned watering-place; its population is 2,250. Monte Carlo, which is about a mile to the east of Monaco, consists of numerous hotels and villas which have sprung up near the gardens of the gambling casino. Its permanent population is about 11,000.

The prince of Monaco was formerly absolute, but since 1911 a constitution has been in force providing for a national council and a ministry to make and enforce the laws. The people are exempt from taxation, as the revenue is almost entirely derived from the enormously profitable rents of the gambling establishments. Population, 1933, 22,153. Visitors number 1,500,000 every year.

MONARCHY, *mon'ar ky*, a state or government in which governing power is vested in a single person, by whatsoever name he may be distinguished. A government in which the subjects have no rights or powers as against the ruler is popularly termed a *despotic*, or *absolute*, monarchy; when the ruler is subject to any law, either written or unwritten, or shares his powers with a legislative body, the government is popularly called *constitutional*, or *limited*, monarchy. The ruler in either case is an hereditary monarch. Great Britain is an example of a limited monarchy of the most advanced type.

Russia and Turkey formerly were types of an absolute monarchy. See GOVERNMENT.

MONASTERIES, *mon'a ster is*. See MONASTICISM.

MONASTICISM, *monas'ti siz'm* a religious system under which those persons live who have renounced worldly things and who, either separately or in communities, devote themselves to the attainment of spiritual perfection. Men and women who live the monastic life are called *monks* and *nuns*.

Although monasticism is generally associated in men's minds with the Christian religion, it is not peculiar to Christianity, nor did the monastic idea originate there. Manifestations of it occurred centuries before the Christian Era, among the Buddhists and Brahmins of India and among the followers of Pythagoras in Greece and in Egypt.

The first Christian hermits we know of were men who, in the middle of the third century, fleeing from the persecutions of Decius and a corrupt society withdrew to the wildernesses of Arabia or Egypt. Among the earliest of these were Paul of Thebes, who lived in a mountain cavern and fed upon the fruit of neighboring palm trees, and Anthony (Saint Anthony), who also lived a solitary life, first in the Nile country and later in the desert by the Red Sea. When the fame of Anthony's wisdom and sanctity spread abroad, many came to him seeking spiritual guidance. In response to their appeal he became a sort of leader or abbot. He is called the Father of Christian monasticism. Anthony's followers were organized into a brotherhood by Saint Pachomius. Henceforth the majority of those who lived the monastic life were not solitaries, but cenobites; however, they retained the title monk (*monachus*, a solitary).

Monasticism was introduced into Europe in the fourth century and spread rapidly. Saints Basil, Jerome, Augustine, Ambrose and Martin were among its zealous promoters there. In the sixth century Saint Benedict, an Italian monk, instituted many reforms in monastic life, founded numerous monasteries, for men and for women, imposed upon each member a vow to remain in one monastery for life and gave his monks a discipline, which, with modifications, has been the rule of monastic life in Western Europe ever since. It included rigid self-denial of all bodily comforts and of course the three fundamental monastic vows of poverty, chastity, obedience.

In the seventh and eighth centuries the Benedictine monasteries, which housed many Irish monks, were the chief civilizing and christianizing influence in Central and Northern Europe. They were the centers of learning. The monks were the teachers of the world. In the next century a new era began in monasticism with the establishment of "Orders," large organizations of monasteries under a single head. The first Order was that of Cluny, which had 2,000 branch monasteries, located in many lands.

The beginning of the twelfth century saw an entirely new development in monasticism, the establishment of the knightly Orders. These arose out of the religious wars waged against Mohammedanism. They included the military Orders—the Knights Hospitalers, the Knights Templars, the Teutonic Knights and about eighty others—and the Orders of Ransom, among which were the Trinitarians and the Order of Our Lady of Mercy, the object of these latter being to free Christian slaves from Moslem captivity. Many thousands of Christians were redeemed by them. About a hundred years after the first military Orders were established there arose the great mendicant Orders, so called because their members lived entirely by begging. These were the Franciscans, the Dominicans, Carmelites and Augustinian Hermits. Many members of these Orders, in spite of their strict vows, became prominent as poets, philosophers, writers and preachers. The great theological lights among them were Albertus Magnus and Thomas Aquinas among the Dominicans, and Duns Scotus and Roger Bacon of the Franciscans. The last of the great religious Orders to be founded was The Society of Jesus, better known as Jesuits, established in 1534 to combat the assault of Protestantism on the Catholic Church. It is the model according to which all religious orders have ever since its founding been conducted.

The Reformation, which was naturally hostile to monasticism, curbed its growth. Subsequent government restrictions acted as a further hindrance to its development on the European continent. In the United States and Great Britain to-day full freedom is allowed in the establishment of monastic institutions, and in those countries monasticism is flourishing. In the former country there are about 4,500 brothers, 4,000 priests and 60,000 nuns belonging to Catholic orders.

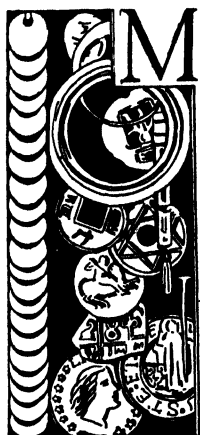
MONCK, CHARLES STANLEY, Viscount (1819–1894), a British statesman, born at Templemore, Ireland, and educated at Trinity College, Dublin. He began his career as a lawyer, and in 1852 was elected to Parliament. From 1855 to 1858 he was Lord of the Treasury. In 1861 he was appointed Governor-General of Canada, serving until 1868.

MONCTON, *mun'k'ton*, N. B., Westmorland County, on the Petitecodiac River, which flows into the Bay of Fundy, and on the Canadian National Railway, eighty-nine miles northeast of St. John.

Moncton has an excellent harbor, in which there is a depth of water varying thirty feet between high and low tide. The principal manufactures include lumber, stoves, woodenware, cotton and woolen goods, wire fences, barrels and railroad cars. The city has the main repair shops of the Atlantic Division of the Canadian National Railway. It is the center of a large oil and gas field, and burns natural gas. The water systems are owned by the municipality. Population, 1921, 17,488; in 1931, 20,689.

MONDAY, *mun'da* (the moon's day), the second day of the week. In English history, the Monday after Easter has been called *Black Monday* since Easter Monday in 1360, when cold, mist and darkness hung over the camps of Edward III outside Paris. *Plough Monday* in England, which began as a fête-day for medieval ploughmen, is the first Monday after Epiphany, and is officially celebrated. *Blue Monday* is a colloquial epithet applied to any day when one's spirits are depressed.

MONET, CLAUDE (1840–1926), one of the founders and a leading exponent of the Impressionist School of Painting, which received its name from his canvas *Impression: Rising Sun*. This and other pictures by Monet's group were rejected by the Paris Salon of 1863, and were exhibited elsewhere, which gave the new school immediate recognition. It met with hostile criticism, which has not entirely disappeared. The Impressionists departed from the traditional handling of subjects and painted with a view to the development of light, color, shadows and perspective. Monet was born in Paris, and there received his education. His principal canvases, besides the one named, are *Fontainebleau Forest*, *Waterloo Bridge*, *The Sun in a Fog*, *Rouen Cathedral*, *The Orchard*, and *Views on the Thames*.



MONEY, a measure of value and the medium of exchange, devised by man to facilitate commerce. If you have even a very moderate amount of it you can secure everything necessary to your reasonable physical requirements. Lacking money, it serves as a standard on which to base your value in the commercial world. You offer your services to a man at so many grains of gold per day; the

number is determined by what that weight in gold will buy of the things you need. Of course you set your price in dollars instead of grains, but the real measure of value is the latter. The dollar is merely a convenient form in which the real measure is circulated.

One View of Money. In Dickens' *Dombey & Son* a pathetic little character is motherless Paul, aged five. His father expected that he would grow up to perpetuate the name and fame of Dombey & Son, and there were constant references to business in the father's talks to the boy, not much of which could he comprehend. One day Paul curiously inquired (quoting from the novel):

"Papa! what's money?"

The abrupt question had such immediate reference to the subject of Mr. Dombey's thoughts that Mr. Dombey was quite disconcerted.

"What is money, Paul?" he answered.

"Yes," said the child, laying his hands upon the elbows of his little chair, and turning the old-young face up towards Mr. Dombey's; "what is money?"

Mr. Dombey was in a difficulty. He would have liked to give him some explanation involving the terms circulation-medium, currency, depreciation of currency, paper, bullion, rates of exchange, value of precious metals in the market, and so forth; but looking down at the little chair, and seeing what a long way down it was, he answered: "Gold, and silver, and copper. Guineas, shillings, half-pence. You know what they are?"

"Oh yes, I know what they are," said Paul. "I don't mean that, Papa. I mean what's money, after all."

Heaven and Earth, how old his face was as he turned it up again towards his father's!

"What is money after all!" said Mr. Dombey, backing his chair a little, that he might the better gaze in sheer amazement at the presumptuous atom that propounded such an inquiry.

"I mean, papa, what can it do?" returned Paul, folding his arms (they were hardly long enough to fold), and looking at the fire, and up at him, and at the fire, and up at him again.

Mr. Dombey drew his chair back to its former place, and patted him on the head. "You'll know better by-and-by, my man," he said. "Money, Paul, can do anything." He took hold of the little hand, and beat it softly against one of his own, as he said so.

But Paul got his hand free as soon as he could; and rubbing it gently to and fro on the elbow of his chair, as if his wit were in the palm and he were sharpening it—and looking at the fire again, as though the fire had been his adviser and prompter—repeated, after a short pause:

"Anything, papa?"

"Yes. Anything—almost," said Mr. Dombey.

What Money Really Is. Money need not possess the familiar form in which we know it; indeed, for a long time it did not. At various times it has been beads, leather, iron, copper, cattle, silver and gold in bulk. There are at least two reasons why these are not desirable as money—they are difficult to handle and they fluctuate in value. In ancient days the owner of an ox might desire to exchange it for clothing, but he might travel far before he found a seller of cloth who was willing to be encumbered with an ox. What was lacking was some valuable medium which the first man could quickly get in exchange for the ox and which the clothing man would as quickly receive.

There are six essentials which must be bought and sold; these are food, water, clothing, shelter, human intelligence, or skill, and human strength, or labor. Money is of no real use except as it enables a person to exchange his labor or his intelligence for food, raiment and shelter, or to exchange the food, raiment and shelter which he has saved, and stored up, for the labor and intelligence of others, or to exchange his commodities for the commodities of others.

The measuring quality of money is that quality which enables a man to determine in commerce how many loaves of bread he may equitably give for a pair of shoes, or how many hours of labor he needs to give to the dentist who repairs his teeth. Every commodity changes in value in accordance with the needs and desires of men. A pure diamond was worth \$100 a carat a few years ago; its value has trebled. Let the demand for diamonds as ornaments cease, and the value would decrease to practically nothing.

ing, for they have few utilitarian uses. A good season produces a great wheat crop, and the price of bread goes down; a great coal strike comes, and the price of coal goes up. A standard measure of value must therefore be based upon a more stable commodity—one which fluctuates the least; it must possess the quality of being universally accepted as a good token of exchange—that is, it must be known as a promise which will not be repudiated and which will always pay for the essentials of life, and it must be practically a stable measure, or standard, of value. It must have those qualities which make it so stable that it will not be quoted at one price to-day and at another next month, for the currency you possess to-day must possess equal value at any future day.

The Stability of Gold. In modern times gold has been this commodity, and for these reasons most nations have used gold as their money standard. For nearly a century the unit of the gold coinage of the United States was the gold dollar, containing 25.8 grains, nine-tenths pure gold. In 1934, the President, by congressional authority, devalued the gold dollar to 15.23+ grains, nine-tenths pure gold. Various other nations discontinued the gold standard as a basis for their domestic coinage, though gold continued to be the basis for the settlement of international balances.

Many years ago—soon after 1870—a silver dollar contained 100 cents worth of silver, and was worth as much melted as in the form of a dollar. But the value of silver began to decrease, and within a dozen years there were times when the silver in a dollar was worth less than fifty cents in gold. All countries experienced the same fluctuation, and as a result most of them adopted gold as their single standard of value. Gold was made the basis of all money standards, and silver was relegated to use in the minor coins—coins of less value than a dollar—called “token money;” they contain less metal than the value stamped upon them. When during the depression years, nations found it difficult to redeem their outstanding obligations in gold, some of them, notably Great Britain and the United States, abandoned the gold standard, at least temporarily.

Minor Coins. The minor coins of the United States and Canada are listed in the following table. The values in the last col-

umn are only approximately correct, because of changes through new laws:

UNITED STATES				
COIN	GRAINS	FINE- NESS *	FACE VALUE	VALUE OF PRINCIPAL METAL
Silver				
Dollar	412.5	.900	\$1.00	\$.50
Half-dollar	192.9	.900	.50	.23
Quarter-dollar ..	96.45	.900	.25	.116
Dime	38.58	.900	.10	.046
Copper				
Five cents	77.6	.750	.05	.002
One cent	48.	.950	.01	.001
CANADA				
Silver				
Dollar	360.	.925	1.00	.44
Half-dollar	180.	.925	.50	.22
Quarter-dollar ..	90.	.925	.25	.112
Dime	36.	.925	.10	.044
Five cents	18.	.925	.05	.02
Bronze (copper tin and zinc)				
One cent	87.5		.01	.002

*Fineness .900 means that only 900 out of every 1,000 grains are the metal which gives the coin its value. The balance of the metal in United States silver coins is copper, in the five-cent piece nickel, and in the one-cent piece tin and zinc.

Silver dollars are legal tender for any amount unless other provision is made in the contract; the smaller silver coins are legal tender up to \$10; and the nickel and copper five-cent and one-cent pieces are legal tender up to twenty-five cents.

How Money is Issued. In the Middle Ages almost every nobleman and many of the cities, besides the rulers of the nations, had the right to coin money. We can imagine the hopeless confusion. Many of the coins were debased, that is, they were actually worth less than the stamp said they were. A poor nobleman would take twenty cents worth of silver, put a stamp on it and call it one dollar's worth. To remedy this situation the privilege of coinage was gradually reserved to the ruler of the country. To-day the money of the world is coined by the governments only. Some paper money, to be sure, is issued in the name of national banks, but it is printed by the government, which also limits the quantity and places safeguards around its circulation, to insure its redemption at face value.

Paper Money. Just as the introduction of stamped metal coins was a great improvement over the use of cattle and camels as money, so the use of paper money for large sums was a great advantage over the use of metal. A thousand dollars' worth of gold or silver makes a large pile; the same amount

in paper money may be considerably less than a handful.

Gold Legislation under Roosevelt. On March 9, 1933, Congress vested the President with power to deal with the financial crisis, and on March 10, by Executive order, gold exports were put under license. On April 5 a second order prohibited the hoarding of gold coin, gold bullion and gold certificates (paper money redeemable in gold), which had to be deposited with the banks and the Treasury Department. On April 19 the Treasury terminated licenses for exporting gold, and the Executive order forbidding all such export followed on April 20. The United States was then officially off the gold standard.

In an effort to raise commodity prices, authority to devalue the gold dollar to one-half its current value was given the President by the Thomas Amendment to the Agricultural Adjustment Act of May 12, 1933. On January 30, 1934, Congress passed the Gold Reserve Act, nationalizing all gold supplies in America, and fixing the upper limit of the revaluation of the dollar at 60 per cent. On January 31, the President issued a proclamation reducing the weight of the gold dollar from 25.8 to 15.23 grains, nine-tenths fine, and its value thus became 59.06 cents. The price of gold advanced from \$20.67 to \$35 an ounce, and from the resulting profit the sum of two billion dollars was earmarked by the Treasury as a stabilization fund. In January, 1937, the Seventy-fifth Congress passed an act extending to June 30, 1939, the stabilization fund and also the authority of the President further to reduce the gold content of the dollar by ten per cent. Congress had passed legislation in 1933 canceling the gold clauses in government and corporation bonds and private promissory notes. The legislation was subsequently upheld by the United States Supreme Court.

Related Articles. Consult the following titles for additional information:

Banks and Banking	Milreis
Bimetallism	Mint
Cent	Note
Check	Penny
Coining	Peso
Coins, Foreign	Plaster
Crown	Pine-Tree Shilling
Dollar	Ruble
Eagle	Rupee
Farthing	Rural Credits
Fiat Money	Shekel
Franc	Shilling
Guinea	Sovereign
Interest	Talent
Legal Tender	Wampum
Livre	Yen

MONEY, IN CANADA. The Canadian system of coinage is of comparatively recent development. Until 1906 all Canadian coins were minted in England. The Ottawa branch of the Royal Mint was established in 1908, and by the Currency Act of 1910 Parliament authorized the Dominion government to provide a gold currency for the country in denominations of \$20, \$10, \$5 and \$2.50, which should be legal tender. In May, 1912, the first \$5 and \$10 gold pieces were issued by the mint, but no gold coins have been struck since 1916. Copper pennies and five, ten, twenty-five and fifty cent pieces in silver are issued, as well as the silver dollar of 100 cents. Five-cent pieces of both silver and nickel are minted. In 1931 the Ottawa branch of the Royal Mint became an independent unit of the Canadian government and is now known as the Royal Canadian Mint. The monetary unit of the Dominion is the gold dollar of 25.8 grains, nine-tenths fine. British and United States gold coins are legal tender at the par rate of exchange, and the British sovereign is legal tender for \$4.82 2/3. Gold payments were suspended in 1933.

The banking system in Canada was authorized by the British North America Act of 1867, which gave Parliament the power to legislate in matters of finance and banking. In 1871 a national Bank Act was passed. Originally, two kinds of paper money were in circulation, the currency notes of the national government and the notes of the chartered banks. (These are the commercial banks of Canada, incorporated under the terms of the Bank Act.) Banking legislation is revised every ten years. In 1934, at the last decennial revision of the banking laws, an act was passed providing for a Central Bank of Canada, with a capital of \$5,000,000, later increased to \$10,000,000. This bank, which began operations in 1935, issues, in place of the Dominion notes, its own notes in denominations of \$1 to \$1,000. All gold coins and bullion held by the chartered banks were transferred to the Central Bank, and the notes issued by these banks are to be withdrawn gradually until eventually the Central Bank will be the only institution authorized to issue paper money. Under this banking act, the Parliament controls both money and credit.

MONEY ORDER, a form of check, except that it is issued by the Postoffice Department,

for the transmission of money from one person to another. It differs otherwise from a check in that it can be transferred by endorsement but once; it is payable only at a designated postoffice, if presented more than thirty days after date of issue, but at any money-order postoffice in continental United States if presented in less than thirty days; it cannot be issued for a sum in excess of \$100.

A money order must be presented for payment within one year. Most towns containing only 300 people are money order offices.

Express money orders are issued by express companies in competition with the government money orders.

MONGOLIA, a vast tableland which until recently formed far northern China, but which today is a part of three countries. The part nearest China proper, northward from the Great Wall, called Inner Mongolia, is yet an extensive province of China, except that its eastern part, about one-fourth of the whole, has been arbitrarily seized by Japan and incorporated into Manchukuo. The larger part of old Mongolia is now independent (see below).

Inner Mongolia. Northward from China proper this province extends roughly to the Gobi Desert, a natural boundary line. It is the fertile section of old Mongolia. The area of Inner Mongolia, before the loss of Jehol province in 1934 to the Japanese, was about 500,000 square miles; roughly a fourth of this area is in Jehol. The present population is about 350,000, mostly Chinese.

Outer Mongolia. In 1911, when the Chinese Empire gave way to a republic, Outer Mongolia renounced its allegiance to China and established a monarchy, which existed until after the World War. Between 1918 and 1924 the Soviet government of Russia extended its influence eastward, and the Bolsheviks were able to overthrow the ruler; on the ruins of his government the Mongol People's Republic was set up, after the Russian pattern. It is not a part of the Union of Socialist Soviet Republics.

The people, about 540,000, on an area of more than a million square miles, are mainly herdsmen.

MONGOLIAN RACE, or YELLOW RACE. See RACES OF MEN.

MON'GOLS, a race of Asiatics who first came into prominence under Genghis Khan (which see), who united the rival hordes. After his death, in 1227, his sons and grand-

sons followed up his conquests, and in 1237 they invaded Russia, devastated the country with horrible cruelty and in two divisions passed into Poland and Hungary. At Pesth the Hungarian army was routed with terrible slaughter, and at Liegnitz, in Silesia, Henry, duke of Breslau, was defeated in a bloody battle, April 9, 1241 (see KUBLAI KHAN). The principal seat of the great khan was transferred to China; the other countries were governed by subordinate khans, all of whom were descended from Genghis, and several of whom succeeded in making themselves independent. The division of the empire politically and the adoption of new religions (Buddhism in the East and Mohammedanism in the West) led to the disintegration of the Mongol power.

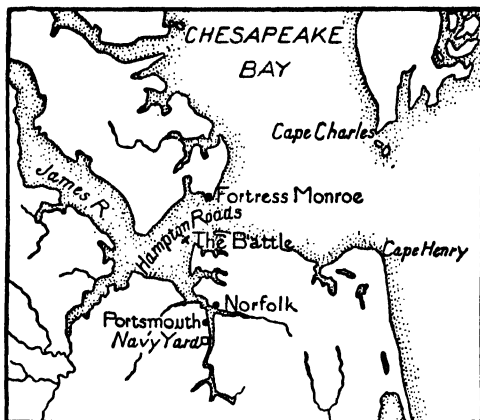
In 1368 the empire of the Mongols in China was overturned by a revolution, which set the native Ming dynasty on the throne. Driven northward to their original home, the eastern Mongols split up into small independent tribes, and finally they were subdued and absorbed by the Manchu conquerors of China. Among the western Mongols appeared a second formidable warrior, Timur, also called Tamerlane, or Timur Beg (see TIMUR). After Timur's death in 1405, his vast empire held together but a short time. In the early part of the sixteenth century, the Mongols lost all importance in world history, became split up into a number of separate tribes and fell under the power of neighboring peoples. Their name still lingers in the Chinese province of Mongolia (see above), but Mongolian tribes are found far beyond its boundaries.

MONGOOSE, or MUNGOOSE, a small, reddish-gray animal of India, remarkable for its skill in destroying rats and other vermin. It is able to kill even the most poisonous snake without injury to itself. It has been introduced in Europe for the purpose of exterminating pests, but its destruction of harmless small animals, of poultry and domestic pets makes it a questionable benefit. The importation of Mongoose into the United States is prohibited.

MONITOR, the name of a genus of large Old World lizards. Some species in Egypt attain a length of six feet. They usually inhabit the neighborhood of rivers and lakes and feed upon the eggs of crocodiles, turtles and aquatic birds. The important species are the *Nile monitor*, common all over Africa, and the Ceylonese *kabara-goya*. The name

monitor is attributable to the belief formerly held that these lizards gave warning of the approach of crocodiles.

MONITOR AND MERRIMAC, two curiously shaped war vessels which were engaged in battle on March 9, 1862, in the American Civil War. The Merrimac was equipped with a peaked roof sloping upward from the deck; the entire exterior was heavily iron-clad. No wooden vessel could successfully compete with it, and the *Merrimac* sank Federal vessels at will. On the evening of March 8 a "cheesebox on a raft" appeared



HAMPTON ROADS AND VICINITY

at Hampton Roads to challenge supremacy. The new craft, the *Monitor*, had a flat deck built not far above the waterline; in its center was a revolving turret large enough to hold two cannons. The entire vessel was covered with 9-inch armor.

The following day the *Monitor* met the *Merrimac* in battle. After a contest of four hours, in which neither vessel was seriously injured, both vessels withdrew. This battle proved conclusively the utility of armor plate and revolving turrets upon war vessels and revolutionized naval construction. Wooden vessels were thereafter useless in war. The *Monitor* sank in a windstorm soon after the battle, while proceeding to Beaufort, N. C. The *Merrimac* was later sunk by its own crew, to keep it from the Federals.

MONK. See MONASTICISM.

MONK, *munk*, or **MONCK**, GEORGE, Duke of Albemarle (1608-1670), an English general, famous for the prominent part he took in the restoration of Charles II. In the struggle between Charles I and the Parliament, Monk joined the royalists; but after

imprisonment he joined the Covenanters and served Cromwell faithfully and with distinction till the latter's death. Then he seems to have decided at once upon the restoration of the Stuarts. To create a majority for Charles II, he called together the Presbyterian members who had been expelled from Parliament in 1648. The king rewarded his restorer with the dukedom of Albemarle, the Order of the Garter and a pension.

MONKEY, a name given to any of the family of four-handed mammals, but generally restricted to the smaller, long-tailed species. They bear a very remote resemblance to human beings, and in their actions are more like humans than are any other lower animals. Children are always delighted when they can observe a cage of monkeys. Different kinds are found in Asia, Africa and South America. Monkeys usually live in trees, and their food, which is chiefly vegetable, is stored by most species in their cheek pouches. Of the American species, all of which have thirty-six teeth, as against thirty-

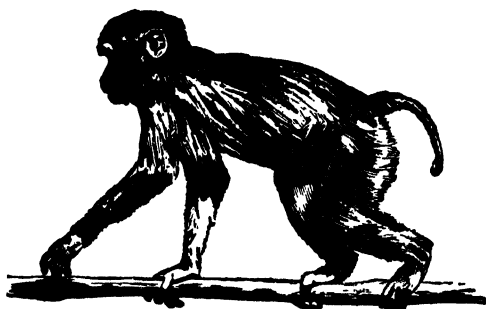


FIG-TAILED MONKEY

two in the Old World species, the *howling monkey* is the largest and fiercest.

It has a long beard and a long tail. The spider monkey, or *coaitia*, is the most graceful American monkey. Its tail serves as a hand, for not only can the monkey swing by it, but it has also a keen sense of touch. The *capuchin* also has a long prehensile tail, covered with hair to the tip. The *sapajous*, the kind usually seen with organ grinders, are smaller and are the most intelligent of American monkeys. The monkeys of the Old World have nostrils opening at the end of the nose.

Monkeys live in pairs; the male has one wife, and no "affinities," it is declared. The food of monkeys is fruit and insects, small

reptiles, young birds and eggs. Some do not thrive in captivity. There is no doubt that monkeys communicate with each other with ease; Prof. Garver once spent a year among forest monkeys in Africa in the endeavor to learn something of their language. Pet monkeys are believed to try to talk to their masters, and they show affection to members of the household in human ways. Large monkeys are called apes.

Related Articles. Consult the following titles for additional information:

Ape Baboon Sapaïou

MONMOUTH, BATTLE OF, an important engagement in the Revolutionary War, fought at Monmouth, N. J., June 28, 1778. The Americans were commanded by Washington and the British by Clinton. It was in this battle that Gen. Charles Lee with 6,000 men was ordered to attack and crush the left wing of the British army. Lee retreated without striking a blow, and it was only by the arrival of Washington that a disastrous rout was prevented (see LEE, CHARLES). The result was a drawn battle, though practically an American victory, and Clinton made his escape to New York.

MONMOUTH, mon'muth, ILL., the county seat of Warren County, on the Minneapolis & Saint Louis and the Chicago, Burlington & Quincy railroads. There is an airport. The city is in an agricultural region which also contains valuable deposits of coal and clay. The principal manufactures are pottery and other clay products, agricultural implements and flour. There is also a considerable trade in dairy products and live stock. Monmouth College is located here (it has an enrollment of about 500 students), and the city also has a county library, a courthouse, a Federal building and a hospital. The place was settled in 1836 and was incorporated in 1852. Population, 1920, 8,116; in 1930, 8,666.

MONMOUTH, JAMES, Duke of (1649-1685), the natural son of Charles II, was always acknowledged by Charles as his son. After the Restoration, he was created duke of Monmouth and was married to the daughter and heiress of the earl of Buccleuch. In 1679 he was intrusted with a command in Scotland and defeated the Covenanters at the Battle of Bothwell Bridge, but gained the disfavor of the king by his mercy to the conquered and was soon afterward sent overseas. A few months afterward he returned without leave and became the center of the

popular movement in which the lives of Lord William Russell and Algernon Sidney were sacrificed. Monmouth was exiled to Holland. On the accession of James II, he was induced to attempt an invasion of England. His small body of undisciplined troops was totally defeated at Sedgemoor, and the duke himself was captured and beheaded, after abject appeals to the king for mercy.

MONOCOTYLEDONS, *mono kot e le'donz*, See COTYLEDON; BOTANY.

MONOMANIA, the name of a form of insanity in which the mind of the patient is absorbed by one idea or impulse and he seems to be insane only in the one direction; in fact, in every other respect he may be of decided ability. Dipsomania and kleptomania are regarded as two phases of monomania.

MONOMETALLISM. See BIMETALLISM.

MONONGAHELA RIVER, one of the two rivers which unite at Pittsburgh, Pa., to form the Ohio River. It is formed by the union of West Fork and Tygart rivers, in West Virginia, runs north into Pennsylvania and unites with the Allegheny at Pittsburgh. Its length, not including its branches, is about 150 miles, and it is navigable for large boats for sixty miles from its mouth.

MONOPOLY, the sole or exclusive right of enjoying certain privileges which affect all the people. In its strict sense monopoly belongs to an economic era which has passed away. The spread of freedom has tended to the abolition of monopoly, whether vested in individuals in corporations or in companies engaged in foreign commerce.

But while monopoly as once understood has passed away, new tendencies have been setting in. Under this more modern system, it has been the aim of the competitor to secure as far as possible, the exclusive sale of the commodity in which he deals, and when the single competitor has not been strong enough to accomplish this, he has sought to attain his object by combination with a group of those engaged in the same business. The modern so-called *trust* is the outcome of such efforts; and the great danger attendant on such gigantic combinations has been the establishment of monopolies injurious to society (see TRUSTS). Laws have been enacted to destroy such combinations. The copyright and patent laws virtually establish monopolies, but merely as an inducement for original research; such activities are wholesome and benefit mankind.

There are certain enterprises which are *natural monopolies*, that is, which of their nature preclude competition if the best interests of people are to be served. The transportation service and telephone service of a city are such monopolies. There is a strong movement in favor of the municipal control of these enterprises.

Related Articles. Consult the following titles for additional information:

East India Company	Municipal Ownership
Hudson's Bay Company	Trusts

MONO-RAIL, SUSPENDED, a peculiar elevated railway erected between Elberfeld and Barmen, Germany. The cars are suspended from a single large central rail, which is supported by steel trusses. This German system is said to excel experimental lines elsewhere in Europe. The points claimed in favor of this system of local transportation are that there is little or no danger of derailing the cars, that the trains can be operated with less power, and that sharper curves can be used than would be possible on the ordinary two-rail system.

MONOTHEISM, belief in the existence of one God, as opposed to polytheism, which is belief in many gods. It may also be contrasted with dualism, and with monolatry, which latter is a belief in many gods but the worship of one. All primitive religions are polytheistic; even savages worship a "supreme" being, imagining him surrounded by lesser divinities. It is probable that from such a polytheistic belief monotheism developed; the inferior deities being gradually eliminated and the superior one retained, the concept of his nature becoming modified as man developed and grew more enlightened. The greatest of monotheistic religious systems are Christianity; Judaism, or the religion of the Hebrews; Mohammedanism, and the religion of Zoroaster.

MONOTYPE. This is the best representative of a class of machines which cast and set type singly, instead of in a line. The monotype has two distinct parts—the perforating apparatus, operated by a keyboard, and the type-casting and setting machine. The operation of the keys perforates a paper tape about four and one-half inches in width, and this perforated tape guides the machine in casting the type. The matrices are arranged in rows in a square frame which can move on its bed back and forth and from side to side. By these movements any matrix

desired can be brought into position for casting its character. The frame holding the matrices is operated by compressed air and is brought into position by means of a series of plugs, which are pressed up or down as the perforated tape is fed into the machine. The perforations in the tape correspond to the characters required in the composition and secure the casting of these characters by elevating and depressing the plugs necessary to bring the proper matrices under the casting apparatus.

The casting and setting apparatus of the monotype are quite complex, and the machine requires more than ordinary mechanical skill for its successful use. However, in the hands of a skilled operator, it does a wide range of work, as it can set a number of different sorts of type in the order called for. While the operation of the monotype is slower than that of the linotype, it is more desirable for book and magazine work, because it can set so many different sorts of type. See **LINOTYPE**.



MONROE, JAMES (1758–1831), an American diplomat and statesman, the fifth President of the United States, and the fourth Virginian to attain the office of chief executive. Of his predecessors, Adams alone was not a native of Virginia. Monroe entered upon his Presidential career matured by years of practical experience. He had helped fight the war for independence, had served three terms in the Continental Congress, had been elected United States Senator and governor of Virginia, been minister to three European countries, and had held the office of Secretary of State throughout Madison's administrations. During his own administrations (he served two terms as President) the United States took its place among the nations as a country whose independence could no longer be questioned, and in this security of its national life the young nation made great strides in commercial and industrial expansion. It was sufficiently strong to announce a new foreign policy, that the United States would protect democracy in the Amer-

ican continents from European aggression. The promulgation of the Monroe Doctrine, as this policy is called, is undoubtedly one of the great events of American political history.

Birth and Youth. Monroe was born in Westmoreland County, Virginia, on April 28, 1758. The Monroes had been living in Virginia for more than a century, and the father and mother of James were well known in the county. The former was of Scotch and the latter of Welsh descent. James was sent to the College of William and Mary when he was sixteen, but before he had been there many months he left the institution to join Washington's army. Commissioned lieutenant in a Virginia regiment, he took part in the campaigns about New York City, was wounded at Trenton, and later fought at Brandywine, Germantown and Monmouth. In 1778 he was sent to Virginia to raise a new regiment. Jefferson, then governor of Virginia, commissioned him to gather information about the southern army, and though he attained the rank of lieutenant-colonel, he seems to have been kept from further active service. Monroe was deeply chagrined, but the experience was beneficial to him, in that it was the beginning of a life-long friendship with Jefferson.

His Public Career. Monroe's first public office was that of member of the Virginia assembly, to which he was elected in 1782. The following year he was sent to the Continental Congress. During his three terms in that body he allied himself with those who were distrustful of a strong central government, and when, in 1788, he sat in the Virginia convention called to ratify the new Federal Constitution, he did everything in his power to prevent its adoption. It was therefore as an Anti-Federalist that he was elected to the United States Senate in 1790.

Though opposed to President Washington in political theories, Monroe was appointed minister to France in 1794. In 1796 he was recalled because of utterances which the President deemed indiscreet and dangerous. Monroe did not always use good judgment in his public speeches, and on one occasion he called the unpopular Jay Treaty, recently concluded with England, "a most shameful transaction." His recall caused intense party feeling, and stirred Monroe to write a defense of his course in France. The document, entitled *View of the Conduct of the*

Executive, was bitterly resented by Washington.

After three years of retirement, Monroe was elected governor of Virginia, holding office until 1802. Meanwhile, in 1801, his friend Thomas Jefferson had been inaugurated President, and in 1802 Monroe was sent to France to help the American representative at Paris, Robert R. Livingston, secure from France the land about the mouth of the Mississippi. As a result of their efforts, the great Louisiana Territory was purchased. The same year, 1803, Jefferson appointed Monroe minister to Great Britain, hoping that he could come to an understanding with the English government regarding the impressment of American seamen. Before anything was accomplished, he was ordered to Madrid to assist Charles Pinckney, minister to Spain, in the difficult task of securing the transfer of Florida to the United States, as the treaty providing for the Louisiana Purchase had left the status of West Florida very indefinite. The Spanish government treated the American envoys with disdain, and their mission was a failure. In 1805 Monroe returned to London to continue negotiations with the British officials. In 1806 William Pinckney was sent to London to aid him, but the treaty finally negotiated was so disappointing that Jefferson refused to submit it to the Senate.

However politicians may have regarded him, Monroe's constituents were unshaken in their faith in him. On his return home he was again elected to the Virginia assembly, and in 1811 was chosen governor. Within a few months he resigned the governorship to become Secretary of State in Madison's Cabinet, where he remained until his own election to the Presidency in 1816. In 1814 and 1815 he also assumed temporary charge of the War Department, and his conduct of affairs during the War of 1812 was widely approved by the people. Especially did he exert himself to guard the national capital from attack. In the election of 1816 Monroe won an overwhelming victory, defeating the Federalist candidate, Rufus King, about five to one. The electoral vote was 183 to 34.

As President. Monroe took up the duties of his new office at a most auspicious time. Although the War of 1812 had its disasters, it had quickened the national spirit of the people, and it was a united, invigo-

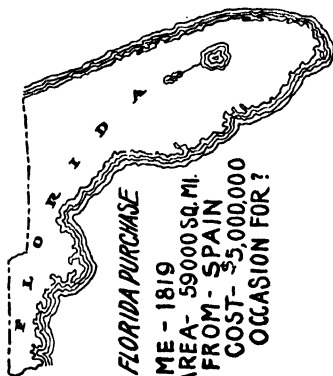
Administration of James Monroe, 1817-1825

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| <p>I. THE PRESIDENT</p> <ul style="list-style-type: none"> (1) Birth (2) Ancestry (3) Education (4) Public career (5) Rank as a statesman (6) Character (7) Death and burial <p>II. AN "ERA OF GOOD FEELING"</p> <ul style="list-style-type: none"> (1) War ended (2) Nation respected abroad (3) Party lines practically disappeared (4) Prosperity and expansion <p>III. IMPORTANT GOVERNMENTAL EVENTS</p> <ul style="list-style-type: none"> (1) Admission of five new states (2) Florida purchase, 1819 (3) The Missouri Compromise, 1820 <ul style="list-style-type: none"> (a) Causes <ul style="list-style-type: none"> (1) Attempt to restrict slavery in Missouri (2) Balance between free and slave states to be kept (b) The compromise <ul style="list-style-type: none"> (1) Framers of the measure (2) Subject matter <ul style="list-style-type: none"> (a) Slavery allowed in Missouri (b) No other slave state north of 36° 30' (c) Maine admitted (4) Election of 1820 <ul style="list-style-type: none"> (a) No parties (b) Only one dissenting vote (5) Monroe Doctrine, 1823 <ul style="list-style-type: none"> (a) Policy of European nations toward American territory (b) Dangers to United States (c) Immediate causes <ul style="list-style-type: none"> (1) Relations of Holy Alliance to South American republics (2) Russia in Alaska (d) President Monroe's statement <ul style="list-style-type: none"> (1) Its form | <ul style="list-style-type: none"> (2) Substance (3) Effect of publication <ul style="list-style-type: none"> (a) In Europe (b) In South America (c) At home (e) Recognition of South American Republics (6) Beginnings of Clay's "American System" <ul style="list-style-type: none"> (a) To build up home industries (b) Home market for American products (c) Tariff of 1824 <p>IV. INTERNAL AFFAIRS</p> <ul style="list-style-type: none"> (1) Westward expansion (2) Visit of Lafayette (3) Crisis of 1818 and depression (4) Northwest fur trade (5) Election of 1824 <ul style="list-style-type: none"> (a) Candidates (b) End of caucus system of nominating (c) Election by the House <p style="text-align: center;">Questions on Monroe</p> <p>Give a short account of Monroe's career before he became President.</p> <p>What general conditions were responsible for the "era of good feeling"?</p> <p>Name the five states admitted to the Union during Monroe's administration.</p> <p>From whom was Florida purchased?</p> <p>Why was that nation so willing to dispose of the territory?</p> <p>Why did the United States desire the acquisition of Florida?</p> <p>What were the causes of the Missouri Compromise?</p> <p>Who were the leaders on both sides of the question?</p> <p>What were the immediate results of its adoption?</p> <p>What is meant by the Monroe doctrine?</p> <p>Why did Monroe make such a statement of principles?</p> <p>Did its publication have the intended effect?</p> <p>What was the Holy Alliance and what were its objects?</p> <p>What was the "American System"?</p> |
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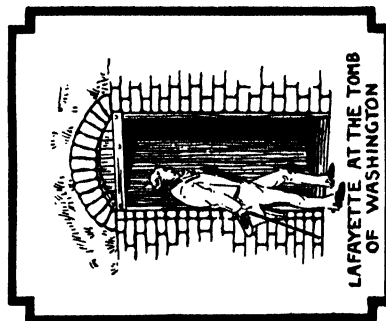
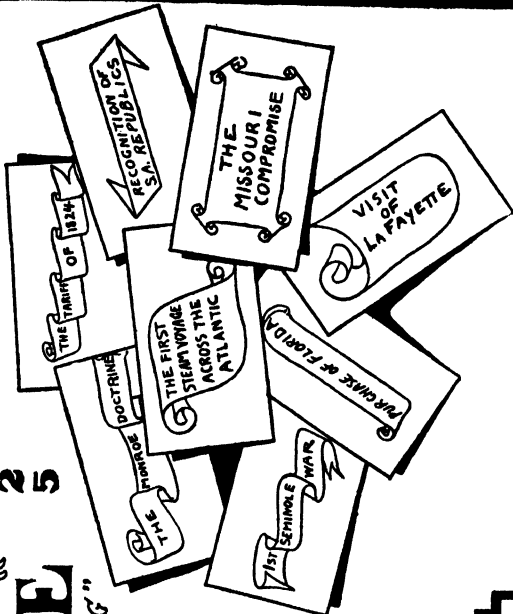
1817 1825
 PEACE FOR THIRTY YEARS
JAMES MONROE

"ERA OF GOOD FEELING"

STATES ADMITTED



IMPORTANT EVENTS



LAFAYETTE AT THE TOMB OF WASHINGTON

Missouri Compromise
 TIME - 1820
 AUTHORS
 STATEMENT
 RESULTS

Monroe Doctrine
 TIME - 1823
 CAUSE
 STATEMENT
 RESULTS

rated nation that entered upon the era of peace. The victories of the American navy had gained for the United States the respect of European nations, and the time was past when American rights could be treated with contempt. Moreover, Monroe's administrations were in a political sense an "era of good feeling." Because of their unpatriotic attitude during the War of 1812 the Federalists lost all semblance of power, and the party as such passed out of existence. Theoretically there was but one party, the Democratic-Republican, soon to be known simply as Democratic. New issues, however, were coming to the front, and the era of good feeling was only superficially harmonious.

One of the questions that was being debated was the right of the government to appropriate money for public improvements, such as highways and canals. Henry Clay was the eloquent advocate of this right, and in the next administration he and his followers formed a new party known as National Republican. Monroe in his first message to Congress stated his firm belief that Congress could not under the Constitution construct roads and canals, and thus there was a distinct cleavage on that point. In this administration the slavery question for the first time became a national political issue. When Missouri and Maine, about the same time, applied for admission as states, the Southerners in Congress insisted that Missouri be admitted as a slave state, to keep the balance between free and slave states even. The famous Missouri Compromise of 1820, prohibiting slavery north of latitude 36° 30', settled for many years the question that was destined finally to be the cause of a great war.

During Monroe's first term there was considerable trouble with the Seminole Indians, in Florida. Andrew Jackson was sent to quell them, and he not only subdued the Indians but nearly brought on hostilities with Spain and Great Britain by a high-handed autocratic attitude. The affair had a happy outcome, however, as eventually Spain agreed to sell Florida to the United States. The purchase treaty was ratified in 1821. Meanwhile, four states had come into the Union—Mississippi, 1817; Illinois, 1818; Alabama, 1819; Maine, 1820. In 1821 Missouri was admitted, after the legislature agreed not to exclude free negroes from the state.

Monroe was reëlected in 1820 with but one dissenting electoral vote, which was given to John Quincy Adams. In 1822, in his annual message, the President recommended that Congress recognize the independence of the republics in South America, and such recognition was promptly accorded. More positive action was felt to be necessary, however, in view of the aggressive attitude of the Holy Alliance, and in December, 1823, Monroe told Congress in his annual message that the United States would deem any attempt to extend the European system to the western hemisphere "dangerous to the peace and safety of the United States." John Quincy Adams, Secretary of State, was largely responsible for the promulgation of this doctrine, but Monroe assumed responsibility for it, and it has gone down in history bearing his name.

It is an interesting fact that one of the last acts of Monroe as President was his signing a bill providing for surveys of national canals. This bill was passed by Congress in 1824, and in spite of the President's convictions on the subject, he felt constrained to yield to public opinion. The attitude of the people on governmental authority was undoubtedly expanding as the nation grew strong and prosperous. In the same year a protective tariff was passed, increasing duties on wool and various other articles produced in the Central and Western states.

The Private Citizen. In 1825 Monroe relinquished the duties of the Presidency to his successor, John Quincy Adams, and retired to private life. He spent a portion of his time at Oak Hill, Virginia, his country estate, and the remainder in New York City. His retirement was varied by his service as regent of the University of Virginia, in 1826, and as member of the Virginia Constitutional convention of 1829. Monroe died on July 4, 1831, exactly five years after John Adams and Thomas Jefferson passed away.

Related Articles. Consult the following titles for additional information:

Adams, John Quincy	Louisiana Purchase
Clay, Henry	Madison, James
Era of Good Feeling	Missouri Compromise
Florida, subhead	Monroe Doctrine
History	Political Parties in the
Holy Alliance	United States
Jackson, Andrew	Tariff
Jay Treaty	War of 1812
Jefferson, Thomas	

MONROE, LA., one of the oldest towns in the state, the parish seat of Ouachita parish, seventy-two miles west of Vicksburg, Miss., on the Arkansas, Louisiana & Gulf, the

Vicksburg, Shreveport & Pacific and the Saint Louis, Iron Mountain & Southern railroads and on the Washita River, which is navigable all the year. The city is in a lumbering and cotton-growing region, and contains cotton compresses, cottonseed oil mills, brickyards, lumber mills and wooden ware factories, a Federal building, a library and a hospital. Population, 1920, 12,675; in 1930, 26,028.

MONROE DOCTRINE, broadly stated, the policy promulgated by the United States government of preventing interference by European powers in the political affairs of American nations, and, especially, its opposition to the extension of monarchical institutions in the western hemisphere.

The occasion of the first definite utterance of this policy was in 1823, when it was suspected that a so-called Holy Alliance, consisting of Russia, Austria, Prussia and France, aimed to interfere in America to restore to Spain the colonies which had gained their independence and had been recognized by the United States. In his message of December 2, 1823, President Monroe declared that—

"The American continents are henceforth not to be considered as subjects for future colonization by any European power. With the existing colonies or dependencies of any European power we have not interfered and shall not interfere. But with the governments which have declared their independence and maintained it, and whose independence we have acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the United States."

This doctrine has been differently interpreted at various junctures in American history, but its general spirit has been followed with scarcely an exception for somewhat more than a century. Two years after its announcement it was successfully invoked to prevent Spain from transferring Cuba to France or England. The first and only important instance of disavowal or disregard of the doctrine was in the signing of the Clayton-Bulwer Treaty of 1850, in which England and America agreed not to occupy, fortify, colonize or assume any dominion over any part of Central America, but joined in guaranteeing the proposed canal across the Isthmus of Panama. By this act the

United States admitted Great Britain to an equal footing with itself in an undertaking purely American in scope and character.

The Monroe Doctrine proved its force and efficiency soon after the close of the Civil War, when the French army, which had established the unfortunate Maximilian upon the throne of Mexico, withdrew at the suggestion of Secretary Seward, supported by a movement of American forces toward the Mexican frontier. Again in 1880 President Hayes announced, in regard to the proposed canal under French control across the Isthmus of Panama, the following policy:

"No European power can intervene for such protection (of the capital invested in the canal) without adopting measures on this continent which the United States would deem wholly inadmissible."

This gained an avowal from the French Cabinet that the government was in no way interested in the enterprise. By far the most important event relating to the Monroe Doctrine prior to 1914 was the Venezuela episode of 1894 and 1895, in which President Cleveland, by a firm avowal of a broad interpretation of the doctrine, led Great Britain and Venezuela to refer their dispute as to boundaries to a friendly arbitrator. After the World War (1914-1919) began it was discovered that Germany had largely colonized a state of Brazil in the hope of establishing a German outpost on the South American continent. It had been done without arousing suspicion of the world.

In recent years the interpretation of the Monroe Doctrine has been upon much more liberal lines than formerly; this has been a necessary departure from the former masterful attitude assumed when the South American nations were in their formative periods and were too weak to assert individual rights. Today these countries, after more than a hundred years of national life, have evolved a national consciousness and a sense of equality, and have on more than one occasion expressed their ability to cope with eventualities without the intervention of their "big brother" at the north.

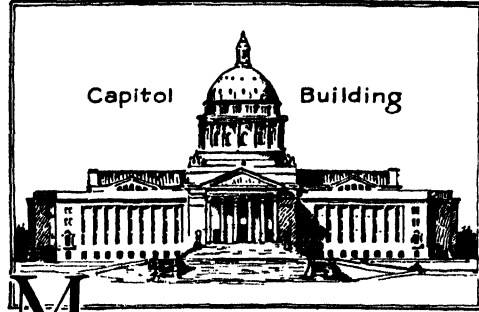
MONROVIA, LIBERIA, a seaport on the west coast of Africa, capital of the only negro republic in the world. It is regularly visited by steamers from European ports, and is the center for the export of palm oil, coffee, dyewoods and rubber. Monrovia is the seat of a Methodist College. It was founded in 1824 and was named after Pres-

ident James Monroe. (See LIBERIA.) Population, estimated, 10,000.

MONSOON', any periodic wind that changes with the seasons. A typical example is the wind which blows steadily along the eastern coast of Asia over about forty degrees of latitude. In winter this breeze is from the northeast, and is dry; in summer it blows from the southwest and causes heavy rainfall. Monsoons are caused, like land and sea breezes, by the difference in temperature between the land and the water. In summer air near the land surface becomes heated, and it rises, and the air over the water rushes in; in winter the sea air is warmer, and the land air rushes outward. Monsoon winds occur off the coast of Guinea, in Africa and the coast of Mexico, and are very nearly perpetual in the Indian Ocean. See WIND.

MONSTROSITY, in anatomy, any departure from natural size or structure. Thus, dwarfs and giants are included in this category, as are albinos, and those with deformities which are very pronounced. Technically, people with even slight variations from normal are so classed, though laymen never so view such cases. Among the latter are those with bones of unusual articulation, imperfect form of any internal organs, cleft palate, harelip or fewer or more than the regular number of fingers or toes.

MONTAIGNE, *montane'*, MICHEL EYQU-EM DE (1533-1592), a famous French essayist, born at the castle of Montaigne, in Périgord. He was a parliamentary counselor from 1557 to 1567, and at one time was gentleman of the king's chamber. In 1571 he retired to his estate and devoted himself to study. In 1580 he traveled in Germany, Switzerland and Italy for his health, which had been shattered by a hereditary disease. After a last visit to Paris, he seems to have dwelt quietly in his chateau. Montaigne's essays have at all times been one of the most popular books in the French language. They embrace an extraordinary variety of topics, which are touched upon in a lively, entertaining manner, with all the raciness of strong, native good sense and handled with a naïve disregard of systematic arrangement. Quotations from and anecdotes of the ancients are interspersed with his own remarks and opinions and with stories of himself in a pleasant strain of egotism. There is an English translation of the essays by Florio, made in 1603, and reëdited by Cotton.



MONTANA, *mon tah'nah*, the third in size among the states of the American Union, exceeded in area only by Texas and California. It contains 146,997 square miles, and in 1930 had a population of 537,606, or an average of 3.7 people to the square mile, a density one-eleventh as great as the average for the United States as a whole. Illiteracy among native whites is only three-tenths of one per cent.

The state's northern limit is the international boundary. Alberta and Saskatchewan are on the north, Idaho on the west, the Dakotas on the east, and Wyoming and Idaho on the south. The greatest length from east to west is 540 miles—a greater distance than from Chicago to Omaha; the average width is 275 miles. The popular name of Montana is THE TREASURE STATE, referring to its attractive scenery and its great resources. The state flower is the bitter root.

Surface and Drainage. The eastern part of the state belongs to the great central plain, and the surface consists almost entirely of rolling prairie, which rises gradually to meet the foothills of the Rocky Mountains to the west. In this prairie region there are occasional isolated buttes, and bluffs occur along the streams. Some of these elevations have been sculptured in a wonderful manner by the winds, and are interesting objects of study. The main range of the Rocky Mountains enters the state on the north about 100 miles east of the western boundary, and extends across the state in a southeasterly direction. To the west of this is the Bitter Root Range, which forms over half of the western boundary. Between these ranges lies a broad basin, whose surface is greatly diversified by numerous spurs and cross ranges. This region is remarkable for the beauty and grandeur of its scenery. In the northern part of the basin are the Kootenais, which extend

northward across the Canadian boundary. Other ranges worthy of mention are the Mission Range, extending north and south, and the Swan Range, east of the Mission Range and nearly parallel with it and culminating in Swan Peak (10,000 feet); east of these are the Big Belt Mountains, containing a number of snow-capped peaks. Near Yellowstone National Park are a number of short ranges. The mountainous portion contains many lofty peaks, some of the most noted being Electric Peak, 11,155 feet; Mount Powell, 12,000 feet and Gallatin, 10,967 feet. The highest point in the state is Granite Peak, 12,850 feet. Glaciers are occasionally found among these mountains, and most of the mountainous region is timbered with pine, spruce, tamarack and hardwood. One of the wonder regions of America—Glacier National Park—is in the northwestern part of the state, joining Rocky Mountains Park in Alberta.

The principal mountain range constitutes the "Continental Divide," which separates the basin of the Missouri from that of the Columbia. That portion of the state west of the Rocky Mountains is drained by the Clark River and its tributaries into the Columbia. The region east of the mountains is drained by the Missouri, which is the most important stream in the state. It rises in the extreme southwestern part of the state and flows northerly, then easterly, till it reaches the eastern boundary. Its chief tributaries are the Yellowstone and the Mussel Shell, flowing into it from the south. All of the streams flows through well-worn channels. The Missouri is navigable to Fort Benton, and the Yellowstone is navigable through the lower part of its course.

Climate. The climate is dry and, considering the latitude of the state, milder than one might suppose. Like other interior regions, Montana experiences a wide range of temperature. In winter it is occasionally as low as 40° or 50° below zero, while in summer it sometimes rises to over 100° above. The mean annual temperature for the state is about 11° for the coldest month and 70° for the warmest. The chinook winds give the region over which they blow much milder winters than it would otherwise have. Because of the dryness of the atmosphere, the changes in temperature are not felt to as great an extent as they are in regions near large bodies of water. The rainfall is light,

averaging about twelve to twenty inches for the state. In the northwestern part of the state there is usually enough moisture for successful agriculture; but in other parts irrigation is advantageous, if not absolutely necessary.

Mineral Resources. Montana is one of the richest states in minerals, and the development of its mines has been an important industry. The state contains large deposits of bituminous and lignite coal, copper, gold, silver and precious stones. The great copper region is around Butte and Anaconda. Butte is the largest mining center in the world, producing of copper alone over 4,500,000 tons per year. Montana, Arizona, and Utah lead in copper production. Arizona is a little ahead usually; Montana and Utah vie for second place. Silver and gold are mined in numerous localities, and since the discovery of these metals in the state, Montana has produced many million dollars' worth. The bituminous coal is of good quality, and its annual production is constantly increasing; the mining of sapphires has also become an important industry, and the state contains valuable deposits of high-grade manganese ore.

Agriculture. The extensive use of dry farming has brought under tillage large areas of fertile soil in addition to that in the irrigated districts; the latter areas are constantly increasing. Under both methods abundant crops are raised, and agriculture is making great progress. The region is also well suited to raising live stock. Montana is second to Texas in the raising of sheep and the production of wool; its annual output of wool is about 20,000,000 pounds. Because of the mild climate in most regions stock can run at large through the winter without protection; hence, the eastern portion of the state is largely devoted to the live stock industry.

The western part of the state between the mountains usually has sufficient rainfall for agricultural purposes, though here irrigation is of great advantage. The chief crops are corn, hay, wheat, oats, potatoes and barley, in the order named. In the mountain valleys are found large orchards, as this region is remarkably well suited to apples and other orchard fruits. Horticulture is here becoming an important industry.

Manufactures. The principal manufactures are directly or indirectly connected with the mining industries and lumbering.

The most important consists in the smelting and refining of ore in the district around Butte. Great smelting works are also located in Anaconda, Great Falls and Helena. Lumber is manufactured extensively in many towns. Coke is manufactured in the vicinity of the coal mines, but not in vast quantities. In some localities there is slaughtering and meat packing, and the manufacture of flour and gristmill products is quite general. The chief agricultural sections are the valleys of the Bitter Root, the Flathead, the Yellowstone and the Gallatin. The latter produces fine barley.

Transportation. Three great trunk lines of railway cross the state from east to west; the Great Northern in the north, having a mileage of over 2,200; the Chicago, Milwaukee, Saint Paul & Pacific, in the center, and the Northern Pacific to the south of it; the latter has a mileage, owned and leased, of 2,500, the longest in the state. The Oregon Short Line enters the state from the south and extends to Butte, and the Chicago, Burlington & Quincy connects with the Northern Pacific at Billings. Numerous branch lines connect with these trunk lines, and give the portions of the state through which they pass good railway facilities. There are areas yet without railway communication, and the autobus is the only means of conveyance.

Education. District schools must remain in session at least three months each year; the school age is from eight to fourteen years for all children, and to the age of sixteen for those unemployed. The University of Montana is at Missoula, the State Normal School is at Dillon, the state School of Mines is at Butte, and the College of Agriculture and Mechanic Arts is at Bozeman.

Institutions. The school for the deaf, blind and feeble-minded is at Boulder, the state orphans' home is at Twin Bridges, and the state soldiers' home is at Columbia Falls. There is a state hospital for the insane at Warm Springs, the penitentiary is at Deer Lodge, and the reformatory is at Miles City.

Cities. There were six cities in the state in 1930 each having more than 10,000 people. In order of size these were Butte, Great Falls, Billings, Missoula, Anaconda and Helena (the capital).

Government. The state legislature consists of a senate of fifty-six members, elected for four years, and a house of rep-

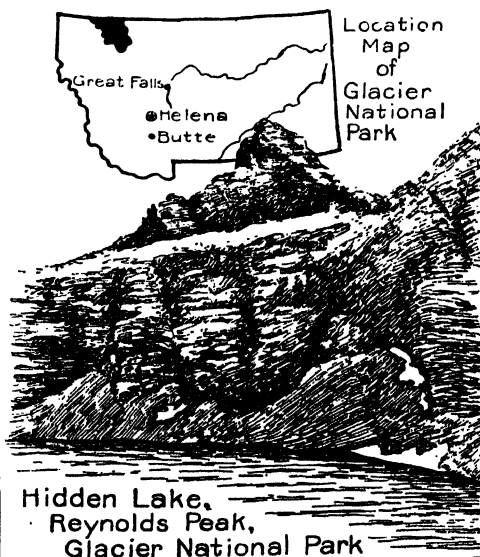


Bitterroot, State Flower

Greatest Sources of Wealth

Copper	5	10	20	30	40
Wheat	5	10	15	20	
Cattle	5	10			
Silver	5				
Timber	5				
Products					

Figures Represent Millions of Dollars Annually



representatives of one hundred two members, elected for two years. The legislature meets every two years, the session being limited to sixty days. The executive department consists of the governor, the lieutenant-governor, the secretary of state, the attorney-general, the treasurer, the auditor and the superintendent of public instruction, each elected for four years. The courts consist of a supreme court of three judges, elected for six years, and district courts each having one or more judges elected for four years. The local administration is by counties; no candidate for office may spend for election an amount exceeding fifteen per cent of one year's salary of the office to which he aspires. Such a law is in force in but few states of the Union.

History. The territory of Montana was possibly visited by the French in 1742. Most of it was included in the Louisiana Purchase of 1803, and it was explored by Lewis and Clark (1805-1806). This expedition was followed by an invasion of miners and trappers representing American and British companies. In 1841 the first Catholic mission was established, among the Flatheads along the Bitter Root. The territory was organized in 1864, being formed of a part of the old Territory of Idaho. In 1876 the Custer massacre occurred on the Little Bighorn River. The discovery of gold (1861) and silver and copper mines and the construction of railroads brought prosperity, and on November 8, 1889, Montana was admitted into the Union as the forty-first state.

Between the years 1907 and 1914 there was industrial discord in mining centers, and severe strikes occurred. Butte suffered most severely, nearly all labor being idle for considerable periods. The Flathead Indian Reservation was opened for settlement in 1910, and in the same year Congress established the Glacier National Park, a wonder-world of 1,400 square miles. See GLACIER NATIONAL PARK.

Woman suffrage was adopted in 1914. Montana was the first state to send a woman (Miss Jeannette Rankin) to the Congress of the United States as Representative. She served one term (1917-1919), then was defeated for a seat in the Senate. By large popular vote the state voted for prohibition, to become effective January 1, 1919. The legislature has empowered cities to adopt the commission form of government.

Items of Interest on Montana

The main range of the Rockies is the Continental Divide, which separates the drainage of the Missouri River system from the Columbia River system.

The Yellowstone River is navigable for 300 miles.

Though small lakes and waterfalls are numerous in the mountains, there is only one large lake in the state, Flathead Lake, twenty-seven miles long and about twelve miles wide, an enlargement of the Flathead River.

Moose and elk, once plentiful, are now found only occasionally in the wilder regions; mountain sheep, bears, wolves, coyotes and lynxes are also becoming rare.

There are about 4,100,000 head of sheep in Montana, yielding 20,000,000 pounds of wool a year; Montana stands second among the states in number of sheep and value of wool produced.

The mining of gold and silver has fluctuated greatly; gold has been of little importance since 1870, but the production of silver continues a great source of wealth. Copper is the metal of supreme value in Montana; only Arizona and Utah challenge its supremacy in production.

Questions

What is the area of Montana? How does it rank in size among the states?

Where is the main chain of the Rocky Mountains? Where are the Bitter Root Mountains?

Name the principal rivers and describe the drainage of the state.

What are the Chinook winds?

What are the leading crops?

Name the leading fruits raised.

How does the state rank in quantity of wool produced?

In the production of what mineral does Montana stand second? What are some other mineral products?

What is the most important manufacturing industry?

What woman did the state elect to Congress?

Related Articles. Consult the following titles for additional information:

CITIES		
Anaconda	Butte	Helena
Billings	Great Falls	Missoula
OTHER TITLES		
Bitter Root	Glacier National Park	
Chinook	Louisiana Purchase	
Copper	Missouri River	
Dry Farming	Yellowstone River	

MONTANA, UNIVERSITY OF, a state university, opened at Missoula in 1895. The institution comprises the college of arts and sciences, the schools of business administration, education, forestry, journalism, law, music, pharmacy; the school of religion (privately supported); the graduate division, the public service division, the department of military science and the summer session. The twenty-two buildings are situated on a campus of 100 acres; adjacent to this is the farm of 520 acres. The total property value amounts to \$2,250,000. The library contains 120,000 volumes and 600 current periodicals. The student enrolment is about 2,000 and the faculty numbers about 105.

MONT BLANC, *moN blahN*, meaning *white mountain*, is a celebrated mountain, the highest in Europe, belonging to the Penine chain of the Alps, situated on the frontiers of France and Italy, near Switzerland. It is a huge mountain mass about thirty miles long, ten miles wide with numerous summits, some rounded, some sharp. The main part of the mountain and the highest summit, 15,781 feet, are in France. The southeast slopes are steep; on the northwest the contours merge into lateral chains. The highest summit is always covered with a great ice cap, from which glaciers perpetually creep downward in all directions. Of these glaciers, the most famous is the Mer de Glace. The summit of Mont Blanc was first reached in 1876 by Jacques Balmat, a mountain guide. In 1918 the French municipality of Chamonix changed the name of one of the peaks of the mountains to Wilson Peak, in honor of the President of the United States.

MONTCALM DE SAINT-VERAN, *mohN kahlm' de saN va rahN'*, LOUIS JOSEPH, Marquis de (1712-1759), a French general. He entered the army in 1726, distinguished himself in several campaigns in Europe and in 1756 was appointed to the chief command of the French troops in Canada. He captured Fort Ontario, took Fort William Henry, on Lake George, and occupied Ticonder-

oga, which he successfully defended against a much superior force of British. He then withdrew to Quebec, where he prepared to meet the British in a decisive conflict. In July, 1759, the attack began, and the British were at first repulsed; but Wolfe led his forces to the Heights of Abraham, a plateau above Quebec, and there the two armies met. The French were driven back, and in the final charge both Wolfe and Montcalm were mortally wounded. Montcalm's last words were, "Thank God, I shall not live to see the surrender of Quebec."

MONT CENIS TUNNEL. See CENIS, MONT.

MONTE CARLO. See MONACO.

MONT'E CRISTO, a small island in the Mediterranean Sea, located twenty-six miles south of Elba and belonging to Italy. It is the seat of a penal colony. Dumas made this island famous through his novel, *The Count of Monte Cristo*.

MONTENEGRO, *mon ta na'gro*, a district in Yugoslavia on the Adriatic coast just north of Albania. Montenegro means *Black Mountain*. The region was early occupied by Serbian peoples but was not a separate nation until the 14th century A. D. It was long ruled by feudal lords who maintained frequent wars with the Turks. An effective effort to establish independent national life was made after the massacre in 1702 of Mohammedans, both foreigners and natives. By 1711 Russia began furnishing financial and other aids to the Montenegrins. But civilization did not develop rapidly as these were a hardy, resolute and freedom-loving race of mountaineers. The blood feud and similar customs long prevailed throughout the country.

Nicholas I drove back the Turks and assisted Serbian insurrectionists against the Austrians. He managed to maintain peace for thirty years and as an autocratic ruler to advance his country's interests. His fourth daughter became queen of Italy, through Russian diplomacy. He wavered between Austria and Serbia in the issues connected with the World War and was crowded out of the picture, and his country united with the new Yugoslavian state, an arrangement not fully completed until 1921. Poverty, political disorder and civil war have caused great distress. In 1929 Montenegro as a political division was abolished by order of the dictator. Population about 200,000.

Life is difficult in this rugged little country, which is almost wholly mountain and forest land. Cereals, tobacco, vines and potatoes are grown, but under primitive conditions. Men and women toil together in the fields. Stock raising is the most important branch of agriculture, and cattle, sheep, goats, wool, hides and skins are exported. The rural homes are poor, with straw roofs without chimneys, and usually with one door and one window.

The Montenegrins are a powerfully built people, physically among the finest in the world. In war they have frequently distinguished themselves. Their latest adventure in this direction before the World War was their alliance with Serbia, Greece and Bulgaria against Turkey in the first Balkan War (1912), and with Rumania, Serbia and Greece against Bulgaria in the second phase of that conflict in the next year. They went joyfully into the conflict against Turkey, for the Turks had ruled Montenegro as a part of their empire from 1862 to 1878, and as cheerfully fought Bulgaria in the second Balkan War.

Related Articles. Consult the following titles for additional information:
 Balkan Wars Jugo-Slavia
 Cetinje World War

MONTEREY, *mon ta ray*, Mex., capital of the state of Nuevo Leon, about 100 miles from the Texas frontier, on the Santa Catalina River. It is a well-built city, with some fine buildings and well-kept streets. It has a considerable transit trade and manufactures woolen goods and carriages. Mineral springs in the vicinity, an agreeable climate and beautiful scenery makes Monterey a popular winter resort for Americans when Mexico is in a state of peace. Population, 1930, 137,388.

MONTEREY, *mon te ra'*, **BATTLE OF**, an important battle of the Mexican War, fought September 21, 1846, between an American force of 6,700 men, under General Taylor, assisted by General Worth, and a Mexican force of 10,000, under General Ampudia. The battle lasted two days, and the Mexicans asked for terms of surrender. The easy terms granted by General Taylor provoked much criticism, but were generally approved by military experts.

MONTE RO'SA. Next to Mount Blanc this is the highest mountain in the Alps, situated on the Swiss-Italian frontier. The mountain is a giant mass crowned by eight peaks, all exceeding 13,000 feet, the tallest

being 15,217 feet. The chief composition of the mountain is gneiss. Iron, copper and gold are found. The ascent of Monte Rosa, first accomplished in 1855, is very difficult. The whole mountain top is covered with glaciers, and the eastern slopes are precipitous.

MONTESQUIEU, *mon tes ku'*, CHARLES DE SECONDAT, BARON DE LA BRÈDE ET DE (1689-1755), a distinguished French historical and philosophical writer. He was educated for the law, but writing about the philosophy of politics and history was his chief interest. His first important work, *Persian Letters* (1721), purported to be the correspondence of two Oriental travelers who subjected European politics, literature, religion and social conditions to caustic criticism. The author was elected to the French Academy in 1728 over the protests of some who had felt the barbs of his satire. *The Spirit of the Laws* (1748), a masterly appraisal of law and politics in an age of social injustice, profoundly influenced the leaders of the American Revolution.

MONTESSORI, *mon te sahr'i*, MARIA (1870-), an Italian educator whose methods of teaching young children are explained in detail in the article following, **MONTESSORI METHOD**. She prepared herself for the medical profession at the University of Rome, and received her degree in 1894, being the first woman to be awarded the honor by that university. After her graduation she became intensely interested in the feeble-minded children who were brought to the clinic where she was assistant doctor. In 1898 Madame Montessori became director of a "mind-strengthening school," established through her influence, and her methods with defective children were so successful she began to feel that they might also benefit normal children. After studying experimental psychology for a time in the University of Rome, she took charge of the *casa dei bambini* (children's houses), or infant schools, in the model tenements which had been erected in the slums of Rome.

MONTESSORI METHOD. Madame Montessori begins instruction in her system of teaching with training the senses, especially the sense of touch. This is true also of Froebel's work; but the latter uses playful methods and games, while the Montessori method is individual training. It is based on contrasts, which are also used by Froebel. The child is given rough and smooth articles, alter-

nately to handle, until he recognizes them well. The name of the quality is taught, but as few words as possible are used by the teacher, lest the child be confused. Similar exercises with colors are given, and after a time the child has exercises in sorting and grading the objects or colors. An immense emphasis is put on the personal action, or "self-activity" of the child; and the teacher must never push him on nor give the new exercise or word until he seems eager for it. This, too, is the method Froebel advocates; but the large numbers of children gathered in our kindergartens under the American school system are not favorable to it. Madame Montessori's work was first successful among very poor children; the parents were so eager to have them begin school that they were often taught to read and write when three or four years old.

The child first gets to know squares, circles, etc., insets in hollow blocks, by touch; he then has large script letters, set in the same way, and fills in outlines with colored chalk. Italian being a phonetic language, the sound is acquired with the name. The children are allowed to choose the forms they wish to outline, so there is no regular order used for the letters; but as they go from one to another, and make the successive sounds aloud they soon discover they are the sounds made in pronouncing words, and begin to make new combinations. Their delight when they find out that they can rearrange these at will, is great. A child will exclaim, "I can write, see, bread, meat, etc.," sounding the successive elements of the Italian words for these, as he forms the letters. After this, reading is of course, only the discovery of the various ways in which sounds are combined in any words, and the children are eager to go on.

It is well to bear in mind that Madame Montessori's system involves constant supervision by the parent or teacher. It is true that liberty for the child is the essence of her plan, but it is not enough to give a child the set of apparatus and say to him, "Here's the Montessori method, take it." A Montessori directress must constantly watch, assist, inspire, guide, explain, correct. The best use of the Montessori system in the home will, perhaps, come from a thorough understanding of what it means. If the parents learn something of the value of child life, of its need for natural activity, of its characteristic

methods of expression, of its limitless possibilities, the work of Madame Montessori will have its reward.

Exercises

In the application of this method there is a definite sequence in which the exercises should be used. This sequence is the result of experience in the Children's Houses.

First Grade. As soon as a child goes to a Montessori school he is taught to move the chairs or seats. This must be done without any noise. Then he may be given the exercises in lacing, buttoning and hooking, illustrated in the color plate, Figure 7. The child should see the parent or teacher do these things and should then be told to do the same thing. These are exercises in practical life. In the education of the senses the first apparatus consists of three sets of cylinders, one of which is illustrated by Figure 6 in the color plate. These cylinders should be used in the following order: first, a set in which the pieces are of the same height but of decreasing diameter; second, the set in which all dimensions decrease; third, those cylinders decreasing only in height. The cylinders should be put into their proper holes by the children. Here the child first begins to fix his attention, he makes his first comparison and his first selection. If he has placed a small cylinder in a large hole, he will soon find that he has a large cylinder which seems to fit nowhere. The box is thus a corrective and helps the child to form impressions of size.

Second Grade. Now the children should learn to rise and sit down in silence. They also learn to walk on a line without wavering from side to side. These are simple exercises, which any mother can show her child. The sense exercises in this grade deal with the "long stair" (figure 8 on color plate) and the tower (figure 5). The tower is built of cubes, the child soon learning that the largest cube must be at the bottom and the smallest at the top. The long stair is a set of rods of different lengths, each rod being divided into units one-tenth of a meter long. The children are early attracted by these sets, but they make many errors. Before the long stair is successfully completed they usually work with the "broad stair," a set of blocks of uniform length, but of varying height and width; when arranged they really look like stairs, the widest step at the top, the narrowest at the bottom.



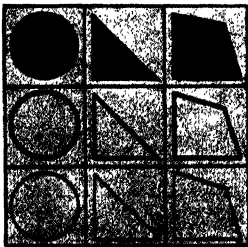
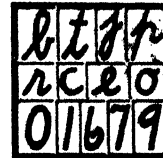
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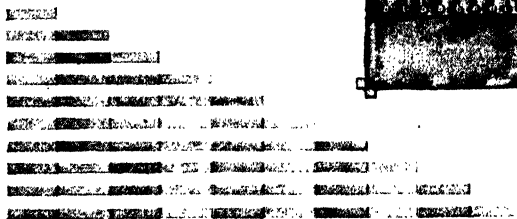
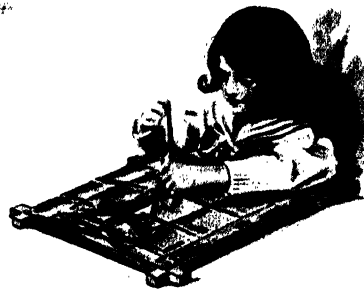
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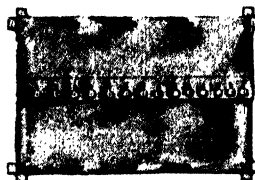
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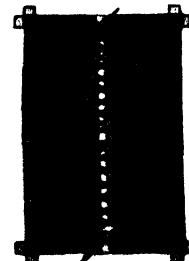
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7



THE MONTESSORI METHOD

1—Spools for use in teaching colors. 2—Script letters of sandpaper. 3—Board to educate the sense of touch.
4—Plane geometrical forms. 5—The "Tower." 6—Weights to teach size. 7—Apparatus

By this time the child is able to fix his attention and maintain considerable interest. The education of the sense of touch is furthered by allowing the child to distinguish between rough and smooth. Alternate strips of smooth wood and sandpaper (as in figure 3) are used, the child being later blindfolded, so that only the sense of touch may be used. At this time also the first exercise in the use of color should be tried. This is called the "pairing of the colors," that is, the recognition of the identity of colors.

Third Grade. By the time the third stage in development is reached the children should be able to wash themselves, dress and undress themselves, dust the tables and learn to handle various objects with ease. Now is the time to introduce gradations in roughness, in color, and in weight. Work with the plane geometric insets (figure 4) should now begin. Here begins the education of the movement of the hand in following the contours of insets, an exercise which is a part of the preparation for writing. The use of the insets marks the transition from the concrete to the abstract. The solid insets are used first, the heavy outline forms next, and the thin lines last.

Fourth Grade. The children should now have advanced so far in the handling of objects that they can set and clear the table. They are also taught how to brush their teeth, clean their nails, and even to brush their hair. Meanwhile by the use of music and through walking on a straight line, they have learned to walk with freedom and perfect balance. They have also learned how to control their own movements, how to move objects without dropping them or breaking them. In the handling of geometrical insets they have advanced another step; instead of merely following the outlines with their fingers, they use pencils. The transition from geometrical figures to the letters of the alphabet is now easy. The child is given letters made of sandpaper (figure 2), which he is taught to recognize. The next step is the arrangement of these sandpaper letters in the form of words. The use of the long stair (figure 8) is continued and numbers are introduced up to 10, the child placing the proper number beside the proper number of blue and red sections on each rod.

Fifth Grade. In this advanced stage the exercises include drawing from nature (flowers, etc.), the use of water colors, the composition of words and phrases with the sand-

paper alphabet, the writing and reading of words and phrases.

Summary. The parent and teacher will realize that all these exercises result in a gradual development of the senses, and a proper correlation of sense impressions. Size, weight, color, all mean something definite to these children. The progression of ideas follows the progression of exercises, as briefly outlined above. The exercises are divided into grades, not because the children are divided into grades, but because each child naturally advances in a more or less fixed order. One child may pass through the five stages in a year, another in two or three years.

LIST OF RECOMMENDED BOOKS. The literature on Madame Montessori and her work is constantly growing. The list below includes the best books on the subject; the more elementary and cheaper books being given first:

The Montessori System. Theodate Smith. Harper Bros. New York.
Guide to the Montessori Method. Ellen Stevens. F. A. Stokes & Co. New York.
Dr. Montessori's Own Handbook. Montessori. F. A. Stokes & Co. New York.
The Montessori Method. Montessori. F. A. Stokes & Co. New York.
The Montessori Method and the American School. Florence Ward. Macmillan Co. N. Y.

MONTEVIDEO, URUGUAY, the capital and leading seaport of the republic, situated on a peninsula on the north coast of the estuary of the Rio de la Plata, sixty-eight miles east of Buenos Aires. It is one of the best-built cities of South America and has an exceptionally fine climate. The principal buildings are a cathedral, a municipal building, a castle, a government building and a national museum. There is a university which has about 700 students. Within recent years large sums have been expended upon improvements of the harbor, which was originally inadequate for the city's commercial needs. These improvements included the construction of docks and breakwaters and the deepening of the harbor opening to permit entrance of the largest vessels. The chief exports are hides, wool, tallow, dried beef and other animal products. The chief imports are cotton, hardware and other manufactured articles. Montevideo sends out above half of the exports of Uruguay and receives all but a small fraction of the imports. Population, 1934, 667,212.

MONTEZUMA, the Aztec emperor of Mexico when Cortez invaded the country in 1519. Influenced by an ancient prophecy, he at first welcomed the Spaniards; but when he discovered that they were not supernatural beings, he secretly took measures for their

destruction. Cortez, on learning of these, seized Montezuma and compelled him to recognize the supremacy of Spain. The Aztecs immediately rose in revolt and refused to be quieted by the appearance of Montezuma. While urging them to submission, he was struck on the temple with a stone and fell to the ground. Cut to the heart by this humiliation, he refused all nourishment, tore off his bandages and soon after expired. See AZTEC; CORTÉZ, HERNANDO.

MONTFORT, SIMON DE, Earl of Leicester (about 1208-1265), an English statesman, famous in the constitutional history of England. Although born in France, he identified himself with the English barons when they rose against Henry III and demanded the redress of grievances. Under the leadership of Montfort, the barons were able to wrest from the king a promise to abide by the measures known as the Provisions of Oxford. When the Pope absolved Henry from his agreement, Montfort objected and Louis IX of France was chosen as arbiter. The question was decided in favor of Henry, and in 1264 the nobles under Montfort took arms to compel the king to carry out his promises. The king was defeated at Lewes, was made prisoner and was compelled to make even more humiliating terms with the barons than had been made by the Provisions of Oxford. As virtual ruler of the country, Montfort summoned an assembly in 1265 which is memorable as the first Parliament at which representatives of the boroughs were permitted to hold seats.

MONTGOMERY, *mont gum'ur y*, ALA., the capital of the state, its third city in size, and the county seat of Montgomery County, 180 miles northeast of Mobile, at the head of navigation on the Alabama River, and on the Louisville & Nashville, the Mobile & Ohio, the Atlantic Coast Line, the Central of Georgia, the Seaboard Air Line and the Western of Alabama railroads. The city is situated on red clay bluffs and is surrounded by the famous black belt, which is productive of cotton, grain and many kinds of fruits and vegetables. Among the prominent structures are the state capitol, a fine Confederate monument, a city hall, a Federal building, a Carnegie Library and Masonic and Pythian temples. There is also a state normal school for colored people, Huntingdon College (a preparatory school), an orphanage and Saint Margaret's Hospital. There is an airport.

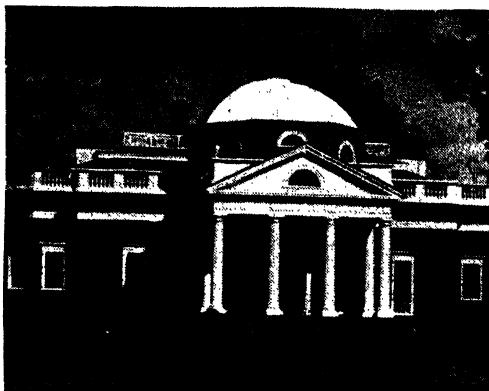
The city is an important market for raw cotton and contains many cotton factories. Forests of yellow pine and deposits of coal, iron and clay are found in the vicinity, and some of the important establishments are foundries, railroad car and repair shops, brickyards, marble works and various factories. New Philadelphia was founded in 1817; East Alabama Town in 1818, and the two were united to form Montgomery in 1819. It was incorporated as a city in 1837, and nine years later it succeeded Tuscaloosa as the state capital. It was the seat of the Confederate government from February to May, 1861. Here the first Confederate Congress assembled. The commission form of government has been adopted. Population, 1920, 43,464; in 1930, 66,079.

MONTH, *munth*, a period of time derived from the motion of the moon, generally one of the twelve parts of the calendar year. *Month* originally meant the time of one revolution of the moon, but as that may be determined in reference to several celestial objects, there are several lunar periods known by distinctive names. Thus, the *anomalistic month* is a revolution of the moon from perigee to perigee, or the points of least distance from the earth; it has an average of 27 days, 13 hours, 18 minutes, 37.4 seconds. The *sidereal month* is the interval between two successive conjunctions of the moon with the same fixed star; average, 27 days, 7 hours, 43 minutes, 11.5 seconds. The *synodical*, or *proper lunar*, *month* is the time that elapses between new moon and new moon; average, 29 days, 12 hours, 44 minutes, 2.9 seconds. The *solar month* is the twelfth part of one solar year, or 30 days, 10 hours, 29 minutes, 5 seconds. The ordinary calendar months vary in length from twenty-eight to thirty-one days. February has twenty-eight days except in leap year, and September, April, June and November have thirty. All the others are months of thirty-one days.

Related Articles. Each of the calendar months is treated in a separate article. For additional information consult the following titles:

Birthstones	Ides	Moon
Calendar	Kalends	Mones
Day	Leap Year	Year

MONTICELLO, *monte sel'lo*, the name given by Thomas Jefferson to his home and estate in Albemarle County, Va., about three miles east of Charlottesville. The mansion was planned by Jefferson, who first occupied it in 1770, while it was still under construc-



MONTICELLO

tion. It was his home for fifty-six years, until his death.

MONTPELIER, Vt., the state capital and the county seat of Washington County, forty miles southeast of Burlington, on the Winooski River and on the Central Vermont and the Montpelier & Wells River railroads. The airport is four miles south of the city. The city contains a handsome capitol, surmounted by a dome rising to a height of 124 feet. It also has the Heaton Hospital, the state library, Kellogg-Hubbard Library, Montpelier Seminary and a state arsenal. Admiral Dewey was born here. The principal industries are granite dressing and the manufacturing of saddlery, woollens, hardware and machinery. This is the home of the National Life Insurance Company. The place was first settled by people from Massachusetts in 1787, and became the capital of the state in 1805. It was chartered as a city in 1894. It is governed by a mayor and council. Population, 1930, 7,837.

MONTREAL, *mon tre awl'*, QUEBEC, the largest city and commercial metropolis of the Dominion, and one of the oldest cities on the North American continent, situated on the island of Montreal, in the province of Quebec. This island is formed by the mouths of the Ottawa, where it empties into the Saint Lawrence River. The city is 164 miles southwest of Quebec, 420 miles by rail north of New York, and 2,760 miles west of Liverpool. Behind the city rises Mount Royal (Mont Réal), from which it derives its name. Situated at the junction of inland and ocean navigation, Montreal has a harbor with miles of wharfrage, accessible to steamers of the deepest draught. There are numerous lines

of steamships which have their Canadian headquarters at Montreal. It is also the chief terminus of the Canadian National Railway and the eastern terminus of the Canadian Pacific, and is entered by several American lines.

General Description. Montreal lies on the southeast shore of the island, which is thirty miles long and one-third as wide at the broadest part. Along the river front are great wharves, trackage, freight houses, grain elevators and other symbols of a vigorous commercial life, and back of this section lies the wholesale district. The retail and office district is located between the wholesale and the residential section, the streets of which climb the slopes of Mount Royal in a series of terraces. On the summit of the mountain is a beautiful public park of 460 acres. A series of long streets run in the general direction of the river front, and these are crossed at right angles by shorter thoroughfares which stretch between the river and the mountain. The main business streets are Craig, Notre Dame, Saint Paul, Saint James, Ontario, Wellington, Saint Catherine, McGill and Bleury; Saint Lawrence Street is the dividing line between East and West Montreal. Originally these divisions were respectively French and English Montreal.

Buildings. Gray limestone quarried in the vicinity, has been used quite generally in building construction, and the city possesses numerous handsome and dignified structures. One of the finest is the Bank of Montreal, built in the Corinthian style of architecture. It stands on the north side of the Place d'Armes, a small park in the heart of the business district. The south side of this square is occupied by the famous Cathedral of Notre Dame (see subhead *Churches*, below). The Royal Trust Building, a handsome structure of granite, is east of the bank, while the postoffice lies to the west. In the vicinity are a number of other substantial bank buildings, including the Bank of British North America. The courthouse and city hall, both noteworthy structures, occupy the north side of Jacques Cartier Square, on Notre Dame street. Opposite the city hall is a quaint old structure—the Château de Ramezay—formerly the residence of the French governor of Montreal, and now used as an historical museum. This is one of several picturesque buildings which have survived the old French period, and suggest to the vis-

itor the historic background of this modern city. Especially in the older part of Montreal, between Notre Dame street and the river, does one find these quaint relics of the past.

Churches. Montreal is one of the largest Roman Catholic cities in North America, and possesses many fine churches of that faith. Foremost among them is the Cathedral of Notre Dame, a massive example of composite Gothic architecture. It is one of the largest churches in the western hemisphere, having a seating capacity of 12,000. Another impressive cathedral is that of Saint James, which is a smaller model of Saint Peter's at Rome. A noteworthy feature is its lofty dome, above which shines forth at night a great cross lighted by electricity. The Jesuit Church, on Bleury Street, is also notable, possessing a series of beautiful fresco paintings. There are also several imposing Protestant churches, notably Christ Church Cathedral, Saint James Methodist and Saint George's Anglican.

Parks and Monuments. The small squares, or *places*, mentioned above, are a characteristic feature of Montreal. There are several of these miniature parks, many of them adorned with handsome statues or monuments. Dominion Square, between Windsor and Cathedral streets, is one of the most pretentious of these city parks. It is faced by Saint James Cathedral, the Y. W. C. A. building and the spacious Windsor Hotel, and contains a bronze statue of Sir John A. Macdonald and a monument to the Canadian heroes who fought in the Boer War. Mount Royal Park, on the mountain top, is beautified with flowers and trees, and is notable for the enchanting view it affords of the city and environs. Another attractive park is Saint Helen's Island, the largest of a group lying in the harbor.

Institutions. Public education in Montreal is under the direction of two separate boards, Roman Catholic and Protestant. Under both systems elementary, high school and college courses are available to students. At the head of the Protestant system is McGill University (which see), and at the head of the Catholic, the University of Montreal. Of the societies of learning, the most important include the Natural History Society, the Montreal Society for Historical Studies and various university organizations. McGill University has an exceptionally fine library, and

the Jacques Cartier Normal School possesses a valuable collection of historical works. The books of the city public library are housed in a beautiful building in Lafontaine Park, in the eastern part of the city. The city possesses a large number of benevolent institutions and is especially notable for its hospitals.

Commerce and Industry. About half the trade of Canada passes through Montreal; it is now the seventh port of the world in annual value of its tonnage. The exports include lumber, grain, flour, dairy products and manufactures, and the imports, textile fabrics, iron and hardware, tea and sugar. The city is a prosperous manufacturing center, with 2,820 factories, having an output of over \$600,000,000. It has the largest flour mill in Canada, and produces large quantities of textiles, leather and leather goods, tobacco products, iron and steel goods and paper. In bank clearings, Montreal is surpassed only by five North American cities, the other four being in the United States.

History. Montreal was founded, under the name of Ville Marie de Montreal, in 1642, on the site of the Algonquin village, Hochelaga. It came into the hands of the English in 1760, when it was taken from the French by General Amherst. It was the seat of government of Lower Canada until 1849, in which year it was superseded by Quebec. Since the completion of the Victoria Bridge (1860), which permits the Canadian National Railway to enter the city, Montreal has developed steadily and enjoyed great prosperity. Population, 1931, 818,577.

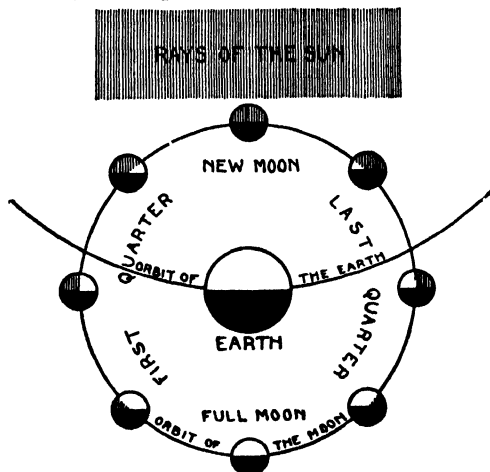
MOODY, DWIGHT LYMAN (1837-1899), an American evangelist, born at Northfield, Mass. At the age of nineteen he engaged in missionary work. During the Civil War and afterward he was a conspicuous missionary agent of the Y. M. C. A. in Chicago, where a large non-sectarian church was organized, with Moody, though not ordained, as its pastor. His success was phenomenal. Accompanied by Ira D. Sankey, the hymn singer, he made an evangelistic tour through England and later in the United States, visiting the largest cities, where the services caused a religious revival. In 1879 Moody opened a seminary for girls at Northfield, Mass., and in 1881, a seminary for boys. In 1886 he founded Moody Bible Institute, Chicago, a school of high rank for Bible students and missionaries.



MOOON, a heavenly body that revolves about the earth in a nearly circular orbit and shines after dark with a silvery, mellow light. It is the only satellite that attends the earth, and to the inhabitants of that planet, it is, next to the sun, the most wonderful and interesting object in the heavens.

Measurements. The mean diameter of the moon is about 2,163 miles, or one-fourth that of the

earth. Its surface is about 14,657,000 square miles, nearly four times the area of Europe, and about one-thirteenth the surface of the earth. The mean density of the moon is a little over one-half that of the earth, and a mass weighing one pound on the earth's surface would weigh less than three ounces on the moon's surface. No other heavenly body excepting meteors is so near to us, its average distance from us being about 239,000 miles. While the moon is making a revolution around the earth, it turns once on its axis and, accordingly, it always presents the same side to us. Exactly 27 days, 7 hours, 43 minutes and $7\frac{1}{2}$ seconds, known as the sidereal month, are required for this revolution. The



PHASES OF THE MOON

lunar month, or the time from one new moon to another, is a little more than 2 days longer.

Phases of the Moon. The changes in the appearance of the moon are known as phases.

Our satellite is a dark globe, receiving all of its light from the sun, and this light reflected toward us makes the moon visible. When the moon is between us and the sun, its dark side is toward us, and it is invisible. This is the period of the new moon. When the moon has moved to a point at right angles with the sun, it is in the middle of its first quarter, and we see one-half of the side of it. When it is fully behind us, we see the full moon, or one-half of the moon's surface. When it is again moved to a right angle, we see again a quarter of the moon's surface. The *new moon* is the thin crescent seen in the west. If the sky is clear, we may then see the entire circle of the moon, the dark parts shining dimly by light reflected from the earth to the moon. A study of the accompanying diagram will make the causes of the different phases of the moon clear, if the reader will remember that the source of light is in the rays of the sun above the cut, and that the portions of the moon which are visible on the earth are white and the invisible parts are black.

Other Facts. An eclipse of the moon occurs when it passes into the earth's shadow; when it prevents the sun's being seen, there is an eclipse of the sun. With the naked eye we can see dark objects on the moon, often said to resemble the continents of the earth and also likened to the face of a man—"the man in the moon." Viewed through a telescope, the surface of the moon is seen to be dotted by mountains, many of which have been named after eminent scientific men. They are sometimes detached in precipitous peaks, but more frequently they form vast continuous ranges. The most prevalent form is that of the crater, sometimes eight to ten miles in diameter and showing evident traces of volcanic action. These craters look like circular forts, with walls sometimes two or three miles high. The interior of these rings is not usually flat and smooth, and oftentimes a mountainous cone rises from the center. Certain craterlike formations which have still greater diameter are generally spoken of as walled plains. Larger still are the gray plains which were at one time taken for seas, before the absence of water from the lunar surface was demonstrated. They may possibly be the floors of old seas. Some of the mountains have been estimated to be over 24,000 feet in height. Other peculiar ridges of comparatively small elevation extend to

great distances, connecting different ranges or craters. There are also valleys of various sizes, and "faults," or closed cracks, sometimes of considerable length. In reading descriptions of the appearance of the moon, it should be remembered that the highest telescopic power yet applied to that planet is only equivalent to bringing it within about 40,000 miles of the naked eye.

As the moon rotates so slowly on its axis, its days and nights are each about fourteen of our days long. During the lunar day the heat must be intense, and during its night, the cold is equally severe. No astronomer has ever been able to detect any water on the moon or any moisture or air surrounding it. With no water or air, human beings cannot exist on the moon; few changes of any sort can take place.

The influence of the moon on the earth and its affairs has always been thought to be great. At one time it was supposed to govern the weather; the time of planting and harvesting were regulated by its phases, and man superstitiously looked to the moon to regulate his affairs. While such things are believed no longer, it is known that the moon does exert remarkable physical influences on the earth, especially in regard to the formation of tides.

Related Articles. Consult the following titles for additional information:

Astronomy	Geology	Solar System
Earth	Harvest Moon	Sun
Eclipse	Month	Tides

MOONFLOWER, a genus of plants belonging to the *Convolvulus* family, which also includes the morning-glory, dodder and sweet potato. It is a climbing vine which produces broad, handsome, heart-shaped leaves and large, white, sweet-scented blossoms, shaped like morning-glories. The flowers open at night and close in the morning.

MOON'SHINERS, a term applied to secret distillers of whisky in remote mountainous regions of the south-central part of the United States, particularly in Kentucky and Tennessee. This unlawful business is conducted usually at night, to escape the attention of internal-revenue officers, hence the name applied to the operators. The people engaged in "moonshining" resent the imposition of a government tax upon the manufacture of liquor and the enforcement of prohibition laws. They are very resourceful in concealing evidences of their illicit

calling, and they regard revenue officers as their enemies. The penalty upon conviction is imprisonment in a penitentiary.

MOONSTONE, a variety of feldspar, used to a considerable extent as a gem. It is either transparent or translucent, with a pearly luster and usually has a pale-blue gray or red tint. See **FELDSPAR**.

MOORE, JOHN, Sir (1761-1809), a celebrated British general, born at Glasgow. He had seen considerable service in the West Indies, Ireland, Holland and Egypt before 1808, when he was appointed commander in chief of the British army in Portugal, to operate against Napoleon. The failure of the Spanish army to coöperate heartily with him rendered many of his plans ineffective, but he advanced to Salamanca in spite of the gravest difficulties, only to learn of the fall of Madrid and the advance of a great army under Napoleon. He retreated to Coruña, a distance of over two hundred miles, but there found himself obliged to face Soult. Moore was killed in the battle.

MOORE, THOMAS (1779-1852), an Irish poet, born in Dublin. From Trinity College, Dublin, he went in 1799 to the Middle Temple, London, nominally to study law; but almost immediately he showed his preference for literature. His *Anacreon* was published not long after his arrival in London, and was soon followed by *Poetical Works of the Late Thomas Little*, a volume of rather sensual verse which increased his reputation. In 1803 he was appointed registrar of the admiralty court at Bermuda, but disliking the post, appointed a deputy and returned to England. In 1806 he published his *Odes and Epistles*. In the writing of verses for Sir John Stevenson's airs, published as *Irish Melodies*, Moore found the work for which his genius was peculiarly fitted. On them his poetic reputation will mainly rest. His most ambitious work, the Eastern romance of *Lalla Rookh*, was published in 1817 and brought its author \$15,000. The *Life of Sheridan* was produced in 1825, and *The Epicurean*, a prose romance, in 1827. Next came the *Life of Lord Byron*, for which he received nearly \$25,000, and the *Life of Lord Edward Fitzgerald*. His remaining works include *The Twopenny Post Bag*, lampoons on the prince-regent and his supporters; the humorous verses called *The Fudge Family in Paris*; *The Loves of the Angels*, and a *History of Ireland*.

MOORS. About the middle of the seventh century Arabian Mohammedans invaded Northern Africa, swept across Mauritania, or what now comprises the Barbary States, as far as the Strait of Gibraltar, took permanent possession of the country west of Numidia and gradually became assimilated with the original inhabitants, the Mauritians. The descendants of these mixed races are known as Moors. In 711 the Moors crossed Gibraltar into Spain and, conquering the Visigoths, took possession of the peninsula. Not satisfied with this, they crossed the Pyrennes, intending to conquer Southern Europe, but in 732 they were met at Tours by Charles Martel, and there took place a conflict regarded as one of the decisive battles of the world, for the Moors were driven back into Spain south of the Ebro, and Europe was saved from Mohammedan rule.

There for centuries, art, science, literature and chivalry flourished among them. Their internal dissensions and divisions, however, weakened them in face of the new Christian kingdoms of Aragon and Castile, and before the close of the thirteenth century their possessions were limited to the kingdom of Granada (see ALHAMBRA). This too, was finally subdued by Ferdinand, in 1492; and while great numbers of the Moors emigrated to Africa, the remainder, under the name of Moriscos, assuming in great part a semblance of Christianity, submitted to the Spaniards. Philip II, however, excited a sanguinary insurrection among the Moors in 1568-1570, which was followed by the banishing of many thousands, and Philip III completed the work in 1610 by finally expelling the last of these, the most ingenious and industrious of his subjects. The expulsion of the Moors was one of the chief causes of the decadence of Spain; for both agriculture and industries fell into decay after their departure. The expelled Moors founded cities in Africa, and these developed into the Barbary states.

MOOSE, the largest member of the deer family, an animal of majestic proportions. A full-grown moose stands six or seven feet high at the shoulders, and sometimes weighs 1,200 pounds. The forelegs are longer than the hindlegs; this gives the animal an awkward appearance. Only the male has antlers, which are broad and flat, with a number of prongs. The male is called *bull moose*. The moose is clumsy, but it is fleet of foot and is a dangerous foe when at bay. The male will

protect his family even to the point of losing his own life. In winter the animals herd together, several families being found



THE MALE MOOSE

in one group; in the summer they scatter, and individual pairs are found around lakes and streams. They are becoming scarcer every year, owing to the zeal of hunters, but are yet found in considerable numbers in the forests of Canada and Maine; there are a few in Northern Minnesota.

MOOSEHEAD LAKE, a lake in Maine, on the border of Somerset and Piscataquis counties. Its length is about thirty-five miles; its width, from one to ten miles. The Moose River and several other streams flow into the lake, while the Kennebec River and the Penobscot River flow out of it. The lake is navigable for steamboats. It is visited annually by many fishermen and tourists.

MOOSE JAW, SASK., at the junction of Moose Jaw River and Thunder Bay Creek, about forty miles nearly west of Regina and 400 miles west of Winnipeg. It is in the heart of the great wheat belt of Canada and is a large industrial center, the most important plants being flour mills, slaughter houses, bridge and iron works, and manufactories of tractors, mattresses and brick and tile. The city is served by the Canadian Pacific and Canadian National railways. The city has large railway shops.

Population, 1931, 21,299.

MORaine, *mo rain'*, masses of rock and gravel carried and deposited by a glacier. The rock masses heaped up along the margins of the glacier are called *lateral* moraines; those formed at the confluence of two glaciers by two inner lateral moraines are called *medial* moraines. When the glacier in its downward movement reaches a region where the temperature is above freezing, the débris it has been carrying is deposited in mounds. Such deposits are called *terminal* moraines. The great terminal moraine of North America deposited in the glacial period extends from Long Island to the Dakotas and thence into Canada.

MORality PLAYS, a class of plays which began to be produced in Europe in the twelfth century and which link the medieval religious drama with the drama of modern times. Their immediate predecessors were the mysteries, dramatic representations of scriptural events only, and the miracle plays which were not confined to Biblical literature, but dealt with legends of the saints and the Church. The morality play marked a tendency to get still farther away from the sacred bounds, and while its theme continued to be ethical it was not essentially religious. The characters personified the vices and virtues. There were also allegorical figures, Riches, Poverty, Justice, Faith, Greed, and so on. The transition in the fourteenth century with these plays to the first modern plays began with the introduction of historical characters and types from real life. Within recent times public interest in the old morality plays was awakened by Ben Greet's production of the old English morality play *Everyman* and by two new plays, *Everywoman* and *Experience*, written on the same model.

MORALS COURT, a modern institution that reflects the new spirit of dealing with criminals and the wayward. In the morals court only persons accused of committing some form of vice are tried, and the attitude of officials in charge is one of sympathy rather than of hostility. The accused are regarded as persons who need help, and reform instead of punishment is the main purpose of the investigators. Social workers find the records of proceedings a valuable source of information. The city of Chicago established the first morals court in the world in 1913; in 1915 a similar court was organized in New York City.

MORATO'Rium, a legal term, taken from the Latin, and meaning an extension of time for the payment of commercial or financial obligations. A moratorium usually takes the form of a decree and is issued by an executive, as the governor of a state, or by a legislative body. Its purpose is to provide relief for those, who because of some calamity, such as fire, flood, earthquake or war, are unable to meet obligations when they fall due.

A government sometimes declares a moratorium because of the interruption of some public service under its control. A moratorium can be extended by the same authority that declared it.

The duration of a moratorium and the region in which it is in force are stated in the declaration. Its effect is to stay legal action that otherwise might be brought for the collection of the obligations falling due. A moratorium does not release the debtor nor the indorsers of commercial paper from their obligations.

In 1931, at the height of the world depression, and at the suggestion of President Hoover, a moratorium was declared on international debts, for one year.

MORA'VIA, formerly a crownland of the Austrian Empire, lying west of Hungary, north of Lower Austria, east of Bohemia and south of Prussian Silesia and Austrian Silesia. In 1918, on the dissolution of the Austro-Hungarian monarchy, Moravia joined with Bohemia, Austrian Silesia and Slovakia to form the republic of Czechoslovakia. The area of Moravia is 8,611 square miles, and the population was estimated at 2,868,000 in 1930. The land consists of a plateau almost entirely bordered by mountains. The minerals are of considerable importance and include iron, coal, graphite and slate. The chief crops are rye, oats, barley, potatoes, flax and sugar beets. Fruit is very abundant, and large quantities of wine are annually produced. In normal years Moravia is a center of woolen manufacture. About seventy per cent of the inhabitants of Moravia are Slavs, and almost all the remainder are Germans. Roman Catholicism is the prevailing religion. The chief city is Brunn. See CZECHOSLOVAKIA.

MORAVIAN BRETHREN, also called United Brethren (*Unitas Fratrum*), a Protestant sect which sprang up in Bohemia and Moravia after the death of John Huss. At

first they spread and increased rapidly, but in time were nearly effaced by European wars and political upheavals. A revival came early in the eighteenth century and they built the town of Herrnhut, in Saxony, which later became a headquarters for the Church. The first Moravian immigrants to America sailed in 1735 and landed in Georgia, but removed in 1740 to Pennsylvania, where they founded a permanent colony. They built the town of Bethlehem, which became the Moravian center of North America and the seat of their American theological seminary.

The Church is not under a centralized government, as is the Roman Catholic, but is in four great independent divisions—the German, British, North American and South American. Each has an executive board and a general conference once every ten years. There are in the United States about 140 Moravian churches and about 21,000 communicants. The Moravians are active in missionary work, and are simple and earnest in their manner of living. Their fundamental doctrines do not differ appreciably from those of other Protestant churches.

MOR'DANTS, certain substances which dyers use for the purpose of fixing colors in fabrics. Among the mordants in common use are alum, several of the salts of iron, potassium, bichromate, tannic acid and certain "fatty acids" in the form of soap.

MORE, THOMAS, Sir (1478-1535), an English author and statesman, born in London. He was intended for the priesthood, but he turned to political life instead and entered Parliament in 1504. Through his opposition to the grants of certain moneys to Henry VII, he won the dislike of the king and soon left Parliament, but on Henry VIII's accession, various honors and offices were given him, and in 1517 he became a member of the king's council. This was quite contrary to his own wishes, as he did not enjoy life at the court. During the troublous times of the Reformation, More, while appreciating the need of Church reform, disapproved of Luther's extreme methods, and he supported Henry VIII in his defense of the Roman Catholic Church, and when Wolsey fell from power the king made More his successor. Henry found, however, when he wished to divorce Catherine and to break with the Church of Rome in consequence of its refusal to sanction the divorce, that More was by no means a tool in his hands. More resigned all his offices,

and when, in 1534, he refused to take an oath subscribing to the measures which excluded Catherine's daughter from the throne and acknowledged Henry as head of the Church, he was imprisoned. The following year he was executed after a most unjust trial. The consternation which Europe felt at his death shows that he was ranked in his own day, as he is in ours, as one of the noblest characters of history. More is best remembered as the author of *Utopia*, a political romance, describing an ideal society on an imaginary island in the Atlantic.

MORELIA, MEX., *mo ra'le ah*, once called VALLADOLID, is the capital of the state of Michoacan, situated in a valley about 6,300 feet above sea level. It is about 125 miles west of the City of Mexico, has a mild and equable climate, is well built, has a cathedral, several fine churches and beautiful promenades. Cotton goods and tobacco are manufactured. Population, 1930, 65,548.

MOR'GAN, DANIEL (1736-1802), an American soldier, born in Hunterdon County, N. J. He removed to Virginia in 1753, accompanied Braddock's expedition two years later and distinguished himself on the frontier. On the outbreak of the Revolution he went at the head of a company of Virginia soldiers to Boston. He accompanied Arnold's expedition to Quebec and took command of the forces after Arnold was wounded. Fighting his way into the very heart of the city, he was captured, was later exchanged, became a colonel of a Virginia regiment and took a prominent part in the Saratoga campaign. He later joined Washington in New Jersey, resigned because of his disgust at the management of the war, but afterwards fought under Gates in the southern campaign. In command of the American forces at the Battle of the Cowpens, he won a memorable victory over Colonel Tarleton's cavalry. He was made a major-general in the army during the Whisky Insurrection and represented Virginia in Congress in 1796.

MORGAN, HENRY, Sir (1635-1688), a famous English buccaneer, born in Wales. When a child he was kidnapped and sold into slavery in Barbados, from which region he worked his way to Jamaica. There he participated in several buccaneering expeditions. In 1663, as master of a ship, he acquired fame by his daring attacks upon towns of the West Indies and Central America. His most famous exploit was the sack of

Maracaibo, where, after capturing the town, he led his men in pillage and the most terrible excesses.

MORGAN, JOHN PIERPONT, (1837–1913), the most notable American financier of his generation. He was educated in Boston and at the University of Göttingen, Germany. In 1860 he became American agent of George Peabody & Co., London bankers. Ten years later he entered the firm of Drexel, Morgan & Co., which became J. P. Morgan & Co.

In 1895 he was the leader of the syndicate that purchased \$50,000,000 of the United States 4 per cent bonds. He was the leading spirit in the consolidation of railways, and his company held a controlling interest in lines aggregating 50,000 miles in extent, besides owning ocean transportation lines and other large corporate interests. Perhaps his greatest achievement was the formation of the United States Steel corporation. He was deeply religious and very generous.

MORGAN, JOHN PIERPONT, (1867–), son of John Pierpont Morgan (see above), American financier and philanthropist. He was educated at Harvard University, and by 1892 became a full partner in Morgan & Company. He led in organizing the International Marine Co., and in purchasing from the French their rights in the Panama Canal.

On the death of his father in 1913 he became senior partner and assisted in raising \$100,000,000 in gold for the treasury of New York City in 1914, in purchasing supplies for the European allies costing \$1,550,000,000 and in selling American securities for Europeans amounting to \$3,000,000,000.

He assisted in organizing the Bank of International Settlements that was called for by the Young Plan for disposing of the German reparations (see YOUNG, OWEN D.).

Mr. Morgan has given of time and money to schools, museums, hospitals, libraries and churches. His London house he gave to the American Embassy.

MORGANATIC MARRIAGE. See MARRIAGE.

MORGANTOWN, W. VA., the county seat of Monongalia County, 103 miles south of Pittsburgh, Pa., on the Monongahela River and the Baltimore & Ohio and the Pennsylvania railroads. There is an airport. The city has a number of glass factories producing the finest table and cut glass, and other minor industries. Oil fields and extensive coal measures are near-by, and their development

makes the city an important commercial center. The West Virginia University is located here. Population, 1930, 16,186.

MORGENTHAU, mawr' gen thou, HENRY, (1856–), lawyer, financier and diplomat. He was born at Mannheim, Germany and came to America in 1865. He graduated from the College of the City of New York and from Columbia University. His business activities were largely concerned with real estate in New York City. He also served as director in large corporations, and in the Equitable Life Assurance Company. As ambassador to Turkey, 1913–1916, he was active in Near East Relief Work and in the care of Greek refugees. He served at the International Wheat Conference and was a financial expert in the London Monetary and Economic Conference.

MORGENTHAU, HENRY, (1891–), American economist and financier, son of Henry Morgenthau (see above). While attending Cornell University, he turned to the study of agriculture. He bought a farm in Dutchess County, New York, and became a neighbor of Franklin D. Roosevelt. He purchased and managed the *American Agriculturist*, and later was appointed conservation commissioner and chairman of the New York State agricultural advisory commission. In 1933 President Roosevelt appointed him to the chairmanship of the Federal Credit Administration. He was later appointed Assistant Secretary of the Treasury, and on the resignation of Secretary Woodin, Mr. Morgenthau was advanced to the post of Secretary of the Treasury.

MORLEY, JOHN (1838–1923), Lord Morley of Blackburn, an English author and statesman, born at Blackburn, Lancashire, and educated at Lincoln College, Oxford. In 1889 he went to London and there for a time edited the *Literary Gazette*, then the *Fortnightly Review*, the *Pall-Mall Gazette* and *Macmillan's Magazine*. He was elected to Parliament in 1883 and some years later was made Secretary of State for Ireland. In 1905 he was appointed Secretary of State for India, and five years later became Lord President of the Council. He resigned the latter post in 1914 because he was opposed to Great Britain's participation in the World War. Morley's works include *Edmund Burke*, *Richard Cobden*, *Voltaire*, *Rousseau*, *Diderot and the Encyclopedists*, *Oliver Cromwell* and a *Life of Gladstone*.

MORMONS, or CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS, a religious organization founded by Joseph Smith, of Sharon, Vt., in 1830. Seven years previously, when he was only fifteen years old, the first two persons of the Trinity had, he declared, visited him. In 1823 and 1827, Moroni, an ancient prophet, visited him; on the second occasion there was delivered to him the golden plates of "The Book of Mormon." The plates were nearly eight inches long by seven inches wide, a little thinner than ordinary tin and bound together by three golden rings. The entire volume was about six inches thick, a part being sealed, and only that part which was unsealed was revealed to him, the other part being reserved for some future time. The letters, characters or whatever they might be called, were of very small size and beautifully engraved. They were in a language unknown to moderns, but called by Smith the "Reformed Egyptian." Accompanying the plates were the Urim and Thummim of Scripture, by means of which Smith claimed to have translated the records thus miraculously discovered.

Oliver Cowdery, a youthful associate of Smith's took down the words as Smith read them to him from the plates, and the first edition of the *Book of Mormon* was issued at Palmyra, N. Y., in 1830. Oliver Cowdery, David Whitmer and Martin Harris united in an affidavit, which prefaced the work, that they had been shown, by an angel who came down from heaven, the plates from which the book had been translated, and this testimony, was supplemented by that of eight other witnesses, including the father and two brothers of Joseph Smith, all of whom claimed to have seen the original plates. No one else was permitted to see them before they were returned to the angel from whom Smith received them. A farmer named Harris having supplied the necessary funds, the book was published, and the new sect of Mormons sprang into active existence and was the means of making multitudes of zealous converts.

The new sect met persecution from the start. Smith organized a church in Fayette, Seneca county, N. Y., April 6, 1830, and then, guided by a revelation, removed to Kirtland, Ohio, in 1831, where a bank was started, with Smith as president. In the same year a colony was founded in Missouri. In 1835 twelve apostles, including Young, were

chosen, and soon after, a council of seventy. In 1838 the Kirtland bank failed, and Smith, accompanied by Rigdon, one of the leaders of the church, fled to a settlement of the sect that had been started at Independence, Mo. Here serious trouble broke out, and the denomination, to the number of 15,000 removed to the east bank of the Mississippi River, in Hancock county, Illinois, and established a new city, which they called Nauvoo. For the first five years the city prospered. Then the editor of the local paper published an article in which he threatened to denounce Smith and expose his immoral practices. The printing establishment was declared a nuisance by the Mormon authorities and was destroyed. This resulted in an outbreak that was quelled only by calling out the state troops. Joseph and Hyrum Smith were arrested and lodged in jail at Carthage, where they were shot by a mob, June 27, 1844. This is one of the historic incidents in the state.

Brigham Young succeeded Smith and under his leadership the Mormons emigrated to the valley of Salt Lake, Utah. Here they suffered many privations during a heroic struggle to form a new community. By irrigation they soon transformed the desert region into a fertile valley, where they have continued to increase in numbers and influence. Most of the difficulties with outside organizations, including the United States government, have arisen from the practice of polygamy. The followers of the original organization claim that the practice was introduced by Joseph Smith in accordance with a divine revelation. The members of the Reorganized Church of the Latter Day Saints, however, claim that the practice was introduced by Brigham Young after the Mormons reached Utah. The Lamoni edition of the *Book of Mormon* contains a strong denunciation of polygamy, and the reorganized branch of the Church has always opposed the practice.

Brigham Young was governor of Utah from 1851 to 1858. In 1882 Congress passed a law, since materially amended, requiring that polygamy be abolished, and in 1890 President Woodruff of the Mormon Church issued a decree forbidding polygamous marriages. The Mormon Church claims 542,200 members in the United States. The Reorganized Church of the Latter Day Saints is an independent church. See **LATTER DAY SAINTS**.

in walled circumference, though the population has overflowed the walls, which are becoming ruins through lack of repairs. The streets are unpaved, dirty, narrow and irregular, and the houses are small and mean. There are several open areas (market-places), a covered bazaar and many mosques. Near the palace, which is in the southern part of the city, is the Jews' quarter, a walled enclosure about two miles in circumference. There are tanning and leather-dyeing establishments, but the manufacture of Morocco leather is not as important as it was formerly. During the Middle Ages the city was one of the chief centers of Mohammedan rule and was famous as a seat of learning, but it has none of its former splendor. Population, 1931, 192,000.

MOROCCO, a fine quality of leather, named for the Moors, who are said to have first developed the skill to make it. It is made from the skins of goats, therefore any leather made from calfskin or cowhide which is called morocco is not what it purports to be. The finest goat skins come from north and east of the eastern end of the Mediterranean Sea, particularly from the Levant. Specialists declare that some element in the soil or climate there breeds goats of finer quality than are found elsewhere in the world, but these animals everywhere yield their skins for the leather which is employed in the best bookbinding, in upholstering the better grades of furniture and in making fine shoes for ladies and children. See **LEATHER**.

MORPHEUS, *mor'fuse*, in classical mythology, the god of sleep, twin brother of Mors, death.

MORPHINE, *mor'fin*, or *mor'feen*, or **MORPHIA**, *mor'fia*, the bitter narcotic principle of opium, first separated from it in 1816. Morphine forms, when crystallized from alcohol, brilliant colorless prisms. As it is very slightly soluble in water, it is never used alone medicinally, but it readily combines with acids, forming salts extensively used in medicine. In small doses it relieves pain; in large doses it causes death, with narcotic symptoms. It is very commonly administered medicinally by hypodermic injection. The habitual use of the drug is exceedingly injurious, and the "morphine fiend" becomes a perfect slave to his appetite. Those addicted to the use take large doses, many times larger than that which would

kill any one who was not inured to the drug. They lose color and flesh, become weak and suffer terrible pains; their memories fail, they lose their moral sense, especially their regard for truth, and become helpless incurables.

MORPHOLOGY, *mor fo'lo gi*, that branch of biology which deals with the form and structure of plants and animals. It embraces study of the life history of an organism and the growth and development of its parts, and searches for resemblances in the various forms. Plant morphology is sometimes called *structural botany*. Animal morphology lays the foundation for the study of physiology. It is through the study of morphology that material is obtained for a systematic classification of all plant and animal forms.

MORRILL, JUSTIN SMITH (1810-1898), an American political leader, born at Stratford, Vt. He was educated in the common schools and engaged in business, but soon entered politics and in 1854 was elected to the national House of Representatives. He was reelected five times and in 1867 entered the United States Senate, where he remained until his death, an unprecedented record. He was always a leader and served on the most important committees. In 1857 he introduced a bill granting public lands for the founding of state colleges to teach agriculture, mechanic arts and allied subjects. The bill was vetoed by President Buchanan, but in 1861 was signed by President Lincoln. By virtue of this and a supplementary act passed in 1890 nearly seventy agricultural institutions have been established. (See **AGRICULTURAL COLLEGE**.) Senator Morrill is perhaps chiefly remembered, however, as the author of the Tariff Act of 1861, which was the beginning of the present system of high tariff.

MORRIS, GOUVERNEUR (1752-1816), an American statesman and diplomat, born at Morrisania, N. Y. He was educated at King's College (now Columbia) and was admitted to the bar in 1771. Four years later he entered the provincial congress of New York. From 1777 to 1780 he was a member of the Continental Congress, and in 1781 he was appointed assistant superintendent of finance under Robert Morris. As a delegate to the Constitutional Convention in 1787 he acted with the strong government party and was always a strong supporter of Washing-

ton. He represented the United States as minister to France and to England and from 1800 to 1803 was United States Senator for New York.

MORRIS, GOUVERNEUR (1876-), an American writer of fiction, the great-grandson of Gouverneur Morris of Revolutionary fame (see above). He was born in New York City and is a graduate of Yale University. Morris is known chiefly as a writer of entertaining stories, and his books number more than twenty. They include *If You Touch Them They Vanish*, *The Incandescent Lily*, *The Wild Goose*, *Yellow Men and Gold*, and *Keeping the Peace*.

MORRIS, ROBERT (1734-1806), an American statesman and financier, and a signer of the Declaration of Independence. Morris was born in England, and emigrated to America at the age of fourteen. He amassed a fortune in business, and entered public life in 1775 as a delegate to the Continental Congress. When Congress fled from Philadelphia to Baltimore in 1776 Morris executed all the continental business, and in 1781 he became superintendent of finance. To meet the financial exigencies of the government he organized the bank of North America, and his financial skill was of the utmost importance to the cause of the Revolution. In 1787 Morris was a member of the convention which framed the United States Constitution and afterwards he was United States Senator from Pennsylvania.

MORRIS, WILLIAM (1834-1896), an English poet, artist and social reformer, born at Walthamstow, near London, and educated at Exeter College, Oxford. In the early years of his career religion was the chief occupation of his keenly alert and vigorous mind, and he had plans for forming a brotherhood, but abandoned the idea for art. In 1859 he married Jane Burden, a noted beauty who had been his model. With Rossetti, Burne-Jones and others he established at London, in 1861, a firm for designing and manufacturing artistic household furnishings; at this time he invented the Morris chair. Later he became interested in textiles, dyes, book illumination and printing. In 1890 Morris founded the famous Kelmscott Press, where many beautiful books, including some of his own, were printed.

Morris did more than any other man of his day to promote the doctrine that ugliness is sin and that all the things necessary for use

in a work-a-day world, including even kitchen utensils, should be of graceful design and pleasing to the eye. From 1885 onward Morris was an active Socialist, writing and lecturing on socialistic subjects. His life is a fine example of an unselfish idealist, who gave of his time, his wealth and his genius for the betterment of mankind. He left numerous volumes of romantic prose and verse, which give him rank as one of the best of all English story-tellers. His poetic inspiration and power of sustained effort are revealed in the *Defense of Guenevere*, the *Life and Death of Jason*, *The Earthly Paradise* and *Sigurd the Volsung and the Fall of the Niblungs*.

MORRIS PLAN BANKS, financial institutions which are organized to make small loans to men who under regular banking rules, imposed by law, cannot borrow money from state and national banks. A man may possess every moral quality to make him a good loan risk, but banks will not listen to his plea for money if he cannot deposit security for the repayment of a loan.

A Morris Plan Bank will lend money to any man of good character. He signs a note, and on it secures the endorsement of two friends in his station in life whose reputations are good. He agrees to pay interest at regular banking rates, and thus is saved from the greed of "loan sharks." Whether a loan is less than \$100 or for a larger sum, it is repaid within a year, at monthly intervals. If payments lapse endorsers are notified. Losses are very small, less than one-tenth of one per cent.

This banking plan was introduced into America by Arthur J. Morris, of Virginia, who founded a Morris Plan Bank in 1900. Increase in number at first was slow, about one a year, but the idea grew in popularity, and there are now 125 banks. State and national banks endorse the Morris idea, and their officers very frequently are among the stockholders and directors of the Morris Plan institutions.

In Europe banks conducted on this plan were very popular for many years before the World War. See **BANKS AND BANKING**.

MORROW, DWIGHT WHITNEY (1873-1931), an American lawyer, financier, and diplomat, a native of West Virginia but for most of his life a resident of New Jersey and New York. He was graduated in the liberal arts at Amherst College in 1895, and in law

from Columbia University in 1899. In recognition of his distinguished services six universities gave him honorary degrees during the succeeding quarter-century.

Morrow entered a New York law firm in 1899, and in 1914 became a partner in the banking firm of J. P. Morgan & Company. In 1927 he resigned from that connection to become ambassador to Mexico, a post he filled for more than two years with extraordinary tact. Returning home in 1930, he was elected as Senator from New Jersey.

MORSE, SAMUEL FINLEY BREESE (1791-1872), the inventor of the electric telegraph. He was born at Charlestown, Mass., and was educated at Yale College, where he devoted a good deal of time to painting miniatures on ivory. His decided preference for an artist's career induced his parents to send him to England in 1811, after his graduation, and under the tutelage of Washington Allston and Benjamin West, he became a good portrait painter. In the collections of the New York Public Library there is a half-length portrait of Lafayette painted by Morse. Continuing his art work on his return to the United States, in 1815, Morse was active in the founding of the National Academy of Design (1825), and was its president from 1826 to 1842.

On a voyage from Europe he worked out a plan for using electro-magnetism in telegraphy. In 1835 he showed the success of his apparatus through a half-mile of wire which he had strung around his room. Two years later he gave a public exhibition of the telegraph, and this is the date generally given for his invention. On his first appeal to Congress for aid in developing the system, he was refused. The next four years he spent in attempting to influence Congress to grant him the necessary appropriation for an experimental telegraph line. He was finally successful and received \$30,000 for the construction of the desired line from Washington to Baltimore. This was finished in 1844 and was completely successful. Alfred Vail, a partner of Morse, did much by his skill and knowledge in perfecting the instruments Morse had invented. In the opinion of some, Mr. Vail was the real inventor of the telegraph, but in a controversy between Morse and Vail concerning some patents, Morse's claims were sustained. The actual facts are that Vail did not change the plan which Morse perfected; he merely

improved the mechanical construction of the instruments.

In addition to the invention of the telegraph, Morse laid the first submarine telegraph across the bay in New York. He also took the first daguerreotypes ever made in America. He received distinguished honors from all countries and was elected to the membership of numerous scientific and learned societies. In 1857 the representatives of ten countries voted him \$80,000 as a reward for his labor. In 1871 a bronze statue was erected in his honor in Central Park, New York. See TELEGRAPH.

MORTALITY, LAW OF, the statement of the average number of persons who die in any assigned period of life, out of a given number who enter upon the same period. Tables and statistics upon which the law is founded are called *tables of mortality*. The table following shows the death rates per thousand of population for specified ages:

AGE	DEATH RATE	
	Of Males	Of Females
Under 5 years	148.8	141.1
5 to 9	17.4	16.7
10 to 14	13.5	12.8
15 to 19	22.0	24.4
20 to 24	28.9	33.3
25 to 29	29.2	33.7
30 to 34	31.7	33.9
35 to 39	39.9	39.9
40 to 44	47.4	43.0

Mortality tables as compiled by the Census Bureau indicate trends, for the statistics are broken up into tables based on age, sex, color, location and cause of death. Such tables are of great value to children's bureaus, welfare agencies, health authorities and sociologists.

MORTAR, *mor'tur*, a vessel in which substances are pounded to a powder by means of a pestle. Mortars are made of wood, stone, iron, glass or porcelain. Those made of wood and stone were the first mills used for grinding corn. In colonial times, the small wooden mortar was a common household utensil and was used for grinding coffee and the seeds that took the place of spices. Small glass and porcelain mortars are used in chemical laboratories and by druggists in compounding medicines.

MORTAR, a large cannon, shorter than a howitzer or other common field gun, which is built for shooting at a steep angle. Most mortars are fired at an elevation of sixty

to seventy degrees. The projectile therefore falls upon its target and not against its side. Aimed at a war vessel the deck of the vessel instead of its side is the target; the interior of a fort is intended to be reached, instead of its walls; the hollow of a trench, instead of its protective earth and sandbags.

The usual range of heavy mortars is 14,000 yards—about eight miles; projectiles for these may weigh as much as 1,000 pounds. Such guns have a caliber of twelve inches. The greatest mortars developed in the World War were of German manufacture; these had a caliber of sixteen and one-half inches. The power of their projectiles nothing could resist; the forts of Liege, Belgium, supposed to be strong enough to resist any guns in Europe, were easily destroyed. The shell employed in the German monsters weighed 1,760 pounds, including 400 pounds of high explosive. Their extreme range was 15,000 yards—over eight miles. Some howitzers may be used as mortars. See HOWITZER; CANNON.

MORTE D'ARTHUR, *môrt dahr tur'*, a name, which, in old French means *death of Arthur*, is applied to several versions of the legend of King Arthur and his knights. The most celebrated of these is Sir Thomas Malory's, first printed in 1485. It has been a treasure-house for subsequent English poets from Spenser to Tennyson, and is immortalized in the latter's *Idyls of the King*. Among modern editions of the *Morte D'Arthur* are Israel Gollancz' (*"Temple Classics"*) and Edward Strachey's (*"Everyman"* edition).

MORTGAGE, *mor'gaje*, in law, the pledge, but not actual conveyance, of an estate, real or personal, by a debtor to his creditor, as security for the payment of a debt. The debtor is called the *mortgagor*; the creditor, the *mortgagee*. The conveyance is subject to a proviso by which it is to become void upon repayment to the mortgagee of the principal sum secured, with interest, on a certain fixed day. Upon the non-performance of this condition, the mortgagee gains absolute ownership at law, but the property remains redeemable in equity during a limited period. In order to obtain absolute possession after there has been default in payment, the mortgagee has to file a bill of foreclosure against the mortgagor, calling upon the latter to redeem his estate forthwith, by payment of the principal money,

interest and costs; and if the mortgagor fail to do so within the time specified by the court, he is forever barred from doing so, and the mortgagee becomes owner in equity, as he before was in law. In the event of a sale, any surplus beyond the amount due the mortgagee must be paid to the mortgagor. If personal property, or *chattels*, are pledged as security, the mortgage is known as a *chattel mortgage*; if real estate is pledged, it is known as *real-estate mortgage*.

What a Mortgage Should Contain. A mortgage must contain a precise description of the property involved, besides the statement of the amount due, the interest, the date and place of final and interest payment, and the names of the mortgagor and mortgagee. Usually a mortgage contains a clause—and it always should, for the protection of the lender—that the whole debt shall be due if the mortgagor (the borrower) fails to pay the interest on the mortgage or the taxes or other assessments against the property. Such a clause protects the holder of the mortgage against the possibility of having the property sold for unpaid taxes. Mortgages formerly also contained a clause empowering the mortgagee to sell the property at once upon the mortgagor's failure to pay the mortgage; most of the states now have laws requiring foreclosure proceedings. Even in states where no such laws exist, the courts have allowed the mortgagor a reasonable time in which to redeem his property. The courts have always favored the rights of the mortgagor, especially the right of redemption.

Following is a common form of mortgage:

THIS INDENTURE WITNESSETH THAT THE MORTGAGORS, William Bruce Clark and Emily Smith Clark, his wife, of the city of Chicago in the County of Cook and State of Illinois, mortgage and warrant to Chester M. Jones, of the city of Chicago, County of Cook and State of Illinois, to secure the payment of a certain promissory note, executed by them, bearing even date herewith, payable to the order of Chester M. Jones, the following described real estate, to-wit: a certain lot of ground, together with the buildings thereon, and all rights and privileges thereto belonging, known as number 237 Walnut Street, the said lot being number 49 in McCormick's subdivision in Lake View, situated in the city of Chicago, in the County of Cook in the State of Illinois, hereby releasing and waiving all rights under and by virtue of the Homestead Exemption Laws of the State of Illinois.

DATED, this second day of July, A. D. 1947.
Witnesses

James Franklin William Bruce Clark (Seal)
McMasters Emily Smith Clark (Seal)
Charles Morse

Foreclosure. Foreclosure is the legal process by which a mortgagee acquires possession

of the property on which he holds a mortgage which is unpaid at maturity. Under the common law the mortgagor was given a reasonable time (depending upon circumstances) in which to *redeem* his property after the payment became due. The mortgagee institutes a bill of foreclosure praying that the amount of principal and interest due be computed and be paid on or before a certain date. If on the day fixed for payment the money is not forthcoming, the property is forfeited and the mortgagee is allowed to retain possession. This is called *strict* foreclosure, and is still the law in England and in some states of the United States. Most of the states, however, employ a method which differs from strict foreclosure in that the property is sold, not forfeited, to satisfy the debt. A foreclosure sale is ordered by a court of equity at the request of the mortgagee, the mortgagor being the defendant. The sale is made at public auction, after proper notice has been published, and is generally under the management of the sheriff or of a referee appointed by the court. The proceeds of the sale, over and above the principal of the mortgage, the interest and the costs of the proceedings, belong to the mortgagor.

If more than one mortgage has been given on the same property, the first mortgage must be paid in full. The holder of a second mortgage or third mortgage takes his chances on getting his money back from the proceeds of the sale over and above the amount due on the prior mortgage. Thus if a farm sells at a foreclosure sale for \$8,000, subject to a first mortgage of \$3,500 and a second mortgage of \$1,500, both mortgages will be paid in full, and there will be a surplus for the mortgagor. If, however, the farm sold for only \$4,700, only the first mortgage could be paid in full; the holder of the second mortgage would receive only \$1,200, less the costs of the sale, and the mortgagor would receive nothing. In some states, if the foreclosure sale results in an unpaid balance, the mortgagor is made liable for a deficiency judgment.

MORTON, JULIUS STERLING (1832-1902), an American politician, born in Adams, Jefferson County, N. Y. He was taken in infancy to Michigan, studied at the state university and completed his education at Union College in 1854. In the following year he went to Nebraska, where he established the first newspaper in the state, the *Nebraska City News*. He was elected to the territorial

legislature and was for a time acting governor. As the Democratic candidate, he was defeated in the election of 1866. In 1881 he was again an unsuccessful candidate for governor. In 1893 he became a member of the Cabinet of President Cleveland, who appointed him Secretary of Agriculture. His administration of this office was notable for his insistence on economy. Morton is especially remembered for the institution of Arbor Day (which see). He was a lover of nature and deeply interested in forestry, and personally planted hundreds of trees, urging the people of Nebraska to do likewise. In 1874, at his suggestion, the state board of agriculture set aside a special tree-planting day; in 1885 the legislature declared April 22, Morton's birthday, a legal holiday, to be observed as Arbor Day. He was an active member of the gold, or conservative, faction of the Democratic party, and up to the time of his death he edited a weekly paper called *The Conservative*.

MORTON, LEVI PARSONS (1824-1920), an American financier, politician and Vice-President, was born at Shoreham, Vt. He graduated at Shoreham Academy and immediately entered upon a mercantile career, founding the banking houses of L. P. Morton & Co. and Morton, Bliss & Co., of New York, with branches and affiliated firms in London. In 1879 he was chosen to Congress from New York, two years later was United States minister to France and in 1889 was elected Vice-President of the United States on the Republican ticket with Benjamin Harrison. In 1895 he was elected governor of New York and served one term.

MORTON, WILLIAM THOMAS GREEN (1819-1868), a celebrated American dental surgeon. After studying at the Baltimore College of Dental Surgery he went to Boston, and continued his studies at Harvard. There he became acquainted with the anesthetic possibilities of sulphuric ether and began a series of experiments with animals. He obtained a patent for the use of ether in 1846, although another doctor also laid claim to the discovery. In 1852 he received the Montyon prize in medicine and surgery. Congress offered Morton \$100,000 for his patent, but he refused to sell.

MOSAIC, *mo zá'ik*, one of the fine arts, which was extensively employed in the Middle Ages and is to a certain extent practiced to-day. It is the most suitable decoration

that has ever been employed in connection with architecture, and the most costly. It is produced by piercing together, upon a bed of cement, bits of marble, stone, colored glass or other suitable material of different colors in such a way as to form an ornamental pattern or picture.

The art of mosaic decoration is of great antiquity. It was first employed in Egypt and Persia, and from there was carried to Greece and thence to Rome. At first it was used only for the pavements of temples, colonnades or such special public building, and the designs, worked out in marble or stone of two colors or black and white, were in the beginning simple geometric patterns in parallel straight lines. Gradually the designs became more and more complicated, figures were introduced and, later, elaborate compositions were evolved—historic and mythological scenes, landscapes, animal forms, portraits. The amount and magnificence of mosaic decoration employed at Rome and other wealthy Italian cities in the days of the Empire is almost unbelievable.

In recent times there has been a new interest in mosaic, particularly in the United States, owing to improvements in the manufacture of glass. The best American examples are in the Church of Saint John the Divine, New York City, and in the Wade Memorial Chapel, Cleveland, which compare not unfavorably with some of the mosaics of Saint Mark's, Venice, Saint Paul's, Rome, and other famous European examples.

MOSCOW, *mos'ko*, ИДАО, the county seat of Latah County, eighty miles nearly south of Spokane, Wash., on the Northern Pacific, and Union Pacific railroads, and several motorbus lines. The University of Idaho and the State Agricultural College are located here. The principal industries of the region are mining, lumbering, farming, fruit growing and stock raising. There are tile and brick works, a flour mill, lumber yards and a number of grain elevators. There is a Carnegie Library and a Federal building. Population, 1920, 3,956; in 1930, 4,476.

MOSCOW, **RUSSIA**, the chief city and capital of the government of the same name, and capital of the Russian Empire from 1462 until 1703. After a lapse of 215 years Moscow again became the national capital, for after the rise to power of the Bolsheviks their leaders transferred the seat of government to that city on March 15, 1918, because

of disorder in Petrograd (later renamed Leningrad) and the nearness of that city to the theater of war. In its restored position as the capital city its population doubled in fifteen years; in 1933 it was 3,663,300, making it the fifth city in the world.

Moscow is located in a highly cultivated district on the Moskva, 400 miles southeast of Leningrad. It is the city where the former czars were crowned, and with it are connected many of the most sacred traditions of the Russian people. The Kremlin, which faces the center of the city, was for centuries the most sacred spot in Russia (see **KREMLIN**); to-day it is the busy seat of the Soviet government. To the east is the Kitai Gorod (Chinatown), the commercial center. This is separated from the rest of the city by an ancient turreted wall. About the Kremlin and the Kitai Gorod extends the so-called White Town (Byely Gorod), and beyond the White City in a broad zone is the section known as the Earthen Town (Zemlyanoi). Outside of all of these quarters are the suburbs, which are larger than all of the rest of the city combined.

Among the chief buildings outside the Kremlin are the Cathedral of Saint Basil and the modern Church of the Savior, Monuments to the old state religion, now discredited by the government; the palace which Napoleon occupied while in Moscow, and the town hall. The principal educational establishment is the Imperial University, founded in 1755 by the Empress Catharine. It formerly had over 4,000 students, a rich museum and a library of 300,000 volumes. Moscow is the first manufacturing city in Sovietland, producing textile fabrics, hats, hardware, machinery, leather, chemicals, and spirits.

The foundation of Moscow dates from the twelfth century, although the site was probably occupied long before. It became the capital of Muscovy and afterward of the whole Russian Empire, but lost this honor when St. Petersburg (now Leningrad) was founded (1703). An important event in the history of the city was its occupation by Napoleon in 1812 and the burning of it for the purpose of dislodging the French from their winter quarters. In 1896, during a festival in honor of the coronation of Nicholas II, the crowd in Moscow was so great and excitement rose so high that over 2,000 people were crushed to death. Great buildings, many of them constructed by Americans, are rising

to care for rapidly increasing housing and business needs. See **BOLSHEVIKI**; **RUSSIA**.

MOSELLE, *mo zel'*, a river which rises in France in the department of Vosges, flows northwest, then north, finally northeast, and after a winding course empties into the Rhine, at Coblenz. Its total length is about 315 miles, over 200 of which are navigable. The wines of the Moselle basin are famous for their delicate aroma. In the early fighting of the World War the German armies following the Moselle for miles in their invasion of France.

MOSES, *mo'zes*, leader, prophet and legislator of the Israelites, born in Egypt about 1600 B. C., during the time of the oppression of the Hebrews. His story is told in detail in these volumes in the article **BIBLE**, subhead *Bible Stories*.

MOSQUE, *mosk*, a Mohammedan house of prayer or worship. It conforms to no particular architectural styles, though it is commonly a square building with an arcade courtyard and surmounted by a dome or cluster of domes and flanked by slender, graceful towers called minarets, from which the muezzin summons the people to prayer. Inside there are no seats, but there are rugs for prayer, and numerous lamps. A fountain for ablutions is an indispensable feature of every mosque interior. The walls are often decorated with arabesque and inscribed with quotations from the Koran. The finest mosque in the world is that of Saint Sophia at Constantinople now Mosque Mehmedie. Another celebrated one is at Cordova, Spain, built in the eighth century, when Mohammedans occupied that country. The main hall of this mosque is 534 by 387 feet, and the roof is upheld by 856 columns.

MOSQUITO, *mos ke'to*, the common name of a group of insects first hated by mankind because of their annoying sting, and later because of the diseases they carry. Only the females torture humanity, but they are found in sufficient numbers to make the entire race unpopular. Mosquitoes are constant inhabitants of the warm regions, and during the summer they penetrate even to the arctic regions. In the United States and Canada there are about twenty-four species, all belonging to the same family.

The common mosquito may be taken as a type of the entire family. The female pierces the skin and sucks the blood of living animals. The proboscis or beak is needle-shaped,

slightly enlarged at the end and covered with minute projections, that give it, when magnified, the appearance of a coarse, round file. It is particularly fitted for an instrument of torture and is the principal cause of the irritation that arises from the bites. The proboscis of the male is too weak to pierce the skins of animals, and it feeds on the juices of plants.

The eggs of the mosquito are laid in stagnant fresh water and appear in boat-shaped masses floating on the surface. Each mass is about a quarter of an inch in length and contains from 200 to 400 eggs, set on end in a single layer. In warm weather the



EGG MASS AND SINGLE EGGS MUCH ENLARGED

eggs hatch in about sixteen hours, the larvae appearing as *wrigglers*. The larvae live in the water, are very active and feed upon minute aquatic organisms. They change to the pupa stage in about seven days under favorable conditions. The pupae float upon the surface and mature in two or three days, when the imago, or perfect insect, appears. The life-history of the mosquito during the summer is



PUPAE OF MOSQUITO

completed within a period varying from eleven to fourteen days, and the insects multiply very rapidly. During cool weather the period of transition is much longer, and many of the larvae remain torpid through the winter, to become perfect insects the next season.

Transmission of Disease by Mosquitoes. The common mosquito in the United States, and in temperate latitudes generally, does not transmit disease, but in tropical climates there is a species whose bite is known to cause elephantiasis. Another species, the *Anopheles*, transmits malaria, and a third, the *Stegomyia*, propagates yellow fever.

All diseases communicated by mosquitoes are caused by germs (see **GERM THEORY OF DISEASE**). Elephantiasis is caused by a small, threadlike worm (*Filaria*), which lives in the lymphatic vessels of the skin. Its presence causes the skin to become thickened, rough, warty, livid in color and insensible to feeling. The worms multiply and pass from the lymphatics into the blood of the infected individual, where they are found

in abundance at night, when the patient is asleep. During the day, however, they do not exist in the blood. The young worms are sucked with the blood of the infected person into the stomach of the mosquito. They remain in the stomach about seventeen days, then penetrate the proboscis. When the infected mosquito bites its next victim the worms escape into the lymphatic vessels of the skin, and there they grow to maturity, multiply and produce elephantiasis.

Malaria Mosquito. The malaria mosquito can be easily distinguished from the common species by the spots on its wings. The parasite causing malaria is a minute protozoan, or animalcule, consisting of only one cell and known as *Hoemamoeba*. This parasite infests the red corpuscles of the blood, grows until it occupies the entire corpuscle, then divides into numerous spores, which escape into the liquid plasma of the blood and in turn infest other corpuscles. See MALARIA.

Yellow Fever Mosquito. The *Stegomyia*, or yellow fever mosquito, is found only in the warm regions. It resembles the common mosquito very closely, but it may be distinguished from it by the silver stripes on the thorax and the abdomen. While the nature of the yellow fever germ is not yet understood, experiments in Cuba in 1900, under the direction of Dr. Sternberg, surgeon-general of the United States army, seem to show conclusively that the disease is communicated by mosquitoes. The commission conducting the experiments constructed two rooms for the purpose. One was furnished with beds and bedding which had been used by yellow fever patients. The bedding was not disinfected or even washed. The room was not ventilated, nor open to the sunlight, but was screened.

Seven non-immune people occupied this room for several days, sleeping in the infected bedding and in some cases wearing the clothing of the yellow fever patients. None of them took the disease. The other room was arranged after the best hygienic plans and was occupied by seven other non-immune persons. Mosquitoes known to have bitten yellow fever patients were placed in this room, and six of the seven people came down with yellow fever. The conclusions of the commission are that yellow fever is not a contagious disease, like smallpox or scarlet fever, but that it is communicated by these mosquitoes and by them only.

How to Fight Mosquitoes. The results of these investigations point to the necessity of destroying mosquitoes, if the spread of the diseases described is to be prevented. Even the common mosquito should be warred against, for the sake of comfort. Destroying the breeding spots of the pests is the best preventive measure, and receptacles or places containing stagnant water should be eliminated in every community. Covering the surface of the water with a film of kerosene will destroy young mosquitoes. Of the animals that prey on mosquitoes the most useful is the dragon fly.

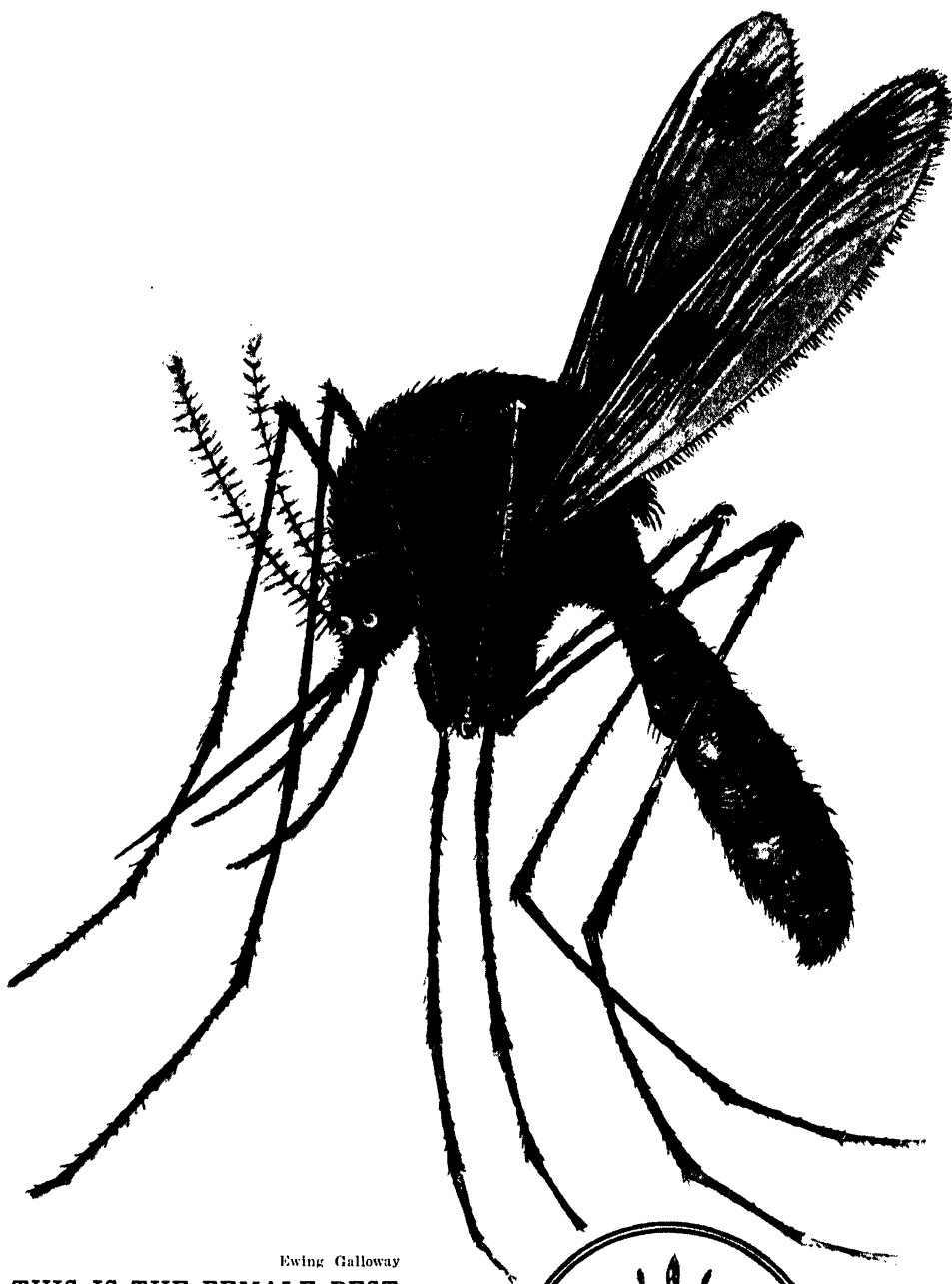
Related Articles: Consult the following titles for additional information:

Dragon Fly	Malaria
Elephantiasis	Yellow Fever

MOSQUITO TERRITORY, more popularly known as MOSQUITO COAST, is a narrow strip of territory in Central America, bordering the Caribbean Sea, which derives its name from the native Mosquito Indians. It is now a part of Nicaragua, but previous to 1906 was an object of contention.

From 1655 to 1850 it was a protectorate of Great Britain, but that country relinquished its claim because the United States objected to British influence so close to the proposed Nicaragua Canal. The Clayton-Bulwer treaty (1850) made the strip independent; in 1859 it was given to Honduras, but the Indians objected to this arrangement, and after years of diplomatic effort it became a part of Nicaragua, in 1894. Not until 1906, however, did all interested parties agree to leave it in permanent possession of that country. The only town of importance is Bluefields (population, 4,706), from which port there are large shipments of tropical fruits to New Orleans.

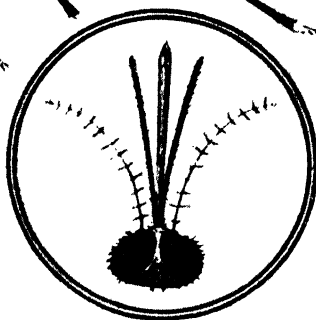
MOSSES, small, leafy-stemmed plants, growing usually in low, thick clusters, with a texture often of velvety softness. They form the botanical order of bryophytes. Mosses often form large and very pretty mats of living green in moist and shady woods. Some species grow on trees and stones, and some live on dry soil. They produce no flowers, but they bear spores in cuplike receptacles, that, when ripe, open and discharge their contents. When these spores fall upon the ground, they develop round, slender, thread-like bodies, upon which, in time, little buds appear, and from these buds grow the familiar moss plant, which again produces organs from which spores are formed.

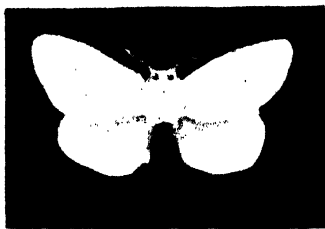


Ewing Galloway

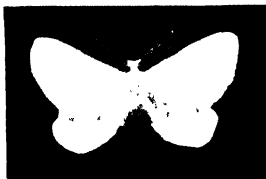
THIS IS THE FEMALE PEST

Mosquitoes attack mercilessly, but only the female is dangerous. Contrary to belief, she does not bite; what seems a bite is a thrust by her long, sharp, straight beak, producing a puncture, through which blood is drawn. The male is only an annoyance; he has no "bite."





7a



6a



1a



2a



3a



4a



5a



7b



6b



5b



8b



2b



3b



4b



1b

BROWN TAIL MOTH

1A Egg Mass and Moth laying eggs.
2A Winter nest.
3A Full Grown Caterpillar.
4A Male Pupa.

5A Female Pupa.
6A Male Moth.
7A Female Moth.

GYPSY MOTH

1B Egg Mass.
2B Full Grown Caterpillar.
3B Female Pupa.
4B Male Pupa.

5B Male Moth.
6B Male Moth at rest.
7B Female Moth.
8B Female Moth laying eggs.

Mosses are very hardy plants and have great power of multiplication, young shoots often springing from old ones which have apparently ceased to live. They can grow where nothing else but lichens can exist, and by their vigorous growth the mosses furnish soil for higher plants. Besides this, they help the higher plants by protecting their roots from cold and by filling up swampy places, which in time make good soil. The sphagnum mosses grow in bogs and wet places. While a portion of the stem dies each year, the tip continues to grow higher, and by this process dense beds many feet thick are formed. In time the stems in the lower levels become peat. Some mosses furnish medicines, and others are used as food, while a great many are suitable for bedding and for packing things easily broken. They are used more for such purposes in the Orient than in America or Western Europe.

MOSZKOWSKI, *mosh kof'ske*, **MORITZ** (1854-1925), a Polish pianist and composer. He was born at Breslau, and studied at Dresden and Berlin. When nineteen years old, he made his debut in concert and after several successful tours settled at Berlin, though in his later years he was more closely identified with the musical life of Paris. Moszkowski wrote voluminously for the piano and among compositions in larger form, produced symphonies, sonatas and suites. Most popular of his works is *Spanish Dances*.

MOTH, the common name of a large group of insects resembling butterflies. A moth is distinguished from a butterfly in three important particulars. The antennae, or feelers, of moths are featherlike and usually taper to a point, while those of butterflies terminate in a knob; the wings of moths are horizontal when at rest, instead of being at an angle with the body; moths usually fly at night and butterflies by day. Butterflies are harmless, but some of the moths are injurious to crops, especially in the grub state, and one small species does incalculable damage to furs and woolen garments. There is one species, however, whose caterpillar spins the thread that makes silk, one of the most valuable fabrics used by mankind.

Related Articles: Consult the following titles for additional information:

Brown-tail Moth	Gypsy Moth
Butterfly	Insects
Caterpillar	Metamorphosis
Codling Moth	Silk
Death's-head Moth	Tussock Moth



MOTHER GOOSE, a beloved imaginary character, supposed to be the writer of those nursery rhymes that are the common possession of children of many lands. The grown-up person who is unable to repeat, at random, dozens of these jingles, is an exception. How and when they were first learned the average adult may not be able to recall, but in the early period of life they became a part of his nature, and he cannot forget them. There is a delightful mystery connected with the Mother Goose rhymes. They have been repeated in many different countries generation after generation, but nobody knows where they started. Like some of the fairy tales children love, they had their origin before printed picture-books were known.

It is almost certain that the name *Mother Goose* came from *Queen Goosefoot*, borne by a genial lady who is found in French legend. Charles Perrault, a French writer of the seventeenth century, issued a book of fairy tales in 1697, called *Mother Goose Stories*, and in 1760 a book of jingles called *Mother Goose Melodies* was published in London. This was the original book of Mother Goose rhymes printed in English, but since that time such books by the thousands have appeared. The pictures for them are often made by artists of high reputation, and no effort is spared to make them attractive.

Why is it, some people ask, that the Mother Goose rhymes hold their popularity? They are nonsensical, objectors argue; they make no pretense at teaching a moral lesson, and they have no educational value. Educators very generally agree that these rhymes are the natural beginning literature for children, and that they are of positive value in the development of the little ones. They afford an excellent channel for the exercise of the imagination and because they are humorous they add much to the little one's joy of life. Small children when normally trained are the happiest beings alive, and they respond instinctively to the gay spirit of the Mother Goose jingles. Moreover, these rhymes are a natural introduc-

tion to real poetry, for they have the swing and lilt that are characteristic of higher verse. A child who has learned the melodies in his nursery picture book will all the more readily feel the rhythm and music of the poetry he studies in school.

As to the moral influence of the Mother Goose melodies this much can be said: They are always cheerful, even when they depict such disasters as Jill falling down hill after Jack, and if they have any effect on the child's character it is likely to be that of making him smile at his own misfortunes. Undoubtedly the child who would be harmed by learning the Mother Goose rhymes never will exist. (The reader will find some of the most popular of these rhymes in the article LANGUAGE AND GRAMMAR, under the section for the First Year.)

MOTHER-OF-PEARL, or **NACRE**, the hard, smooth, iridescent inner surface of several kinds of bivalve shells, chiefly those of the pearl oyster and river mollusk. This lining is destitute of coloring matter, but is composed of a series of minute and slightly overlapping layers, or ridges, which break up the light rays, thus producing beautiful rainbowlike hues. The large oysters of the tropical seas secrete a nacreous coat of sufficient thickness to render their shells valuable to manufacturers. Mother-of-pearl is extensively used in the arts, particularly in inlaid work, and in the manufacture of handles for knives, buttons and other small articles.

MOTHER'S DAY, a day set apart in the United States to honor mothers. The second Sunday in May has been thus selected, and the day is observed generally in churches by special sermons or other exercises. The wearing of a white carnation has been accepted as an appropriate expression of sentiment. Miss Anna Jarvis of Philadelphia was the first to suggest the idea of observing Mother's Day, on which everyone pays tribute to the best mother in the world—his own.

MOTHER SHIPTON, an Englishwoman who lived about 1640, whose sharp and prophetic tongue gave her the reputation of a sorceress. She prophesied many things, among them, "Carriages without horses shall go." Some people believe this to have shown occult knowledge of the coming of the automobile. *Mother Shipton's Prophecies* were published in 1681.

MOTHERS, NATIONAL CONGRESS OF. See CONGRESS OF MOTHERS, NATIONAL.

MOTHERS' PENSIONS, monthly allowances paid by the state to destitute mothers to enable them to care for their children. Nearly every state in the American Union has enacted laws bearing on the subject; they are not uniform, but the object of all is the same. In some states allowances are made to mothers with husband in prison or unable to work, while in others only widows may draw them. In certain states any needy mother is entitled to a pension, and in a few, allowances are granted to any parent, grandparent or guardian unable to care for a minor child. The sums paid vary according to the number of children who are dependent. The rate may be \$12 per month for the first child, with a smaller sum for each additional one. In no state is the maximum pension more than \$50 to \$70, regardless of the number of dependents.

MOTION, LAWS OF. See DYNAMICS.

MOTIVATION IN TEACHING. See GAMES AND PLAYS; METHODS OF TEACHING; THIRIFT; VOCATIONAL EDUCATION.

MOTLEY, JOHN LOTHROP (1814-1877), a distinguished American historian, born at Dorchester, Mass. After graduating from Harvard College he studied in Germany at the universities of Berlin and Göttingen, and while there formed a friendship with Bismarck that both men greatly valued. Motley studied law on his return to America, but the urge to write was already leading him toward a literary career, and in 1839 he published an undistinguished novel, *Morton's Hope*. In 1841 he went abroad again as secretary to the American legation at the Russian capital, but soon resigned. In later years he was ambassador to Vienna (1861-1867) and minister to London 1869-1870). Meanwhile he had written several critical essays and *Merry Mount*, a novel, but his fame rests on his great series produced between 1856 and 1874—*Rise of the Dutch Republic*, *History of the United Netherlands* and *The Life and Death of John of Barneveld*. These histories take high rank for their colorful style, dramatic form of narrative and accuracy, but have the fault of religious and political bias, due to Motley's great admiration for William of Orange.

MOTOR BOAT, a small boat, larger than a rowboat, which is propelled by power furnished by a gas engine or, in some cases, by

electricity from a storage battery. Gasoline engines, usually less powerful than those employed in automobiles (the smallest are one-half horse power), are in almost universal use. It is not entirely proper to class as a motor boat a rowboat to whose stern can be attached at pleasure a one-cylinder motor. This is a small device which was first used in 1915.

A true motor boat is equipped with a permanently-placed engine, set as low as possible, with a driving shaft running from it to a screw propeller at the rear. The boat is constructed with a narrow bow, which maintains it well up in the water; the stern sinks quite low, so the propeller is at least a foot under water. The fuel tank is placed in the high bow, and the gasoline flows by gravity to the engine, thus making a pump unnecessary. The steering apparatus may be a small wheel, connected with the rudder by means of ropes, or it may be a hand-operated rod attached to the rudder. The speed of the average boat of this class is from ten to twenty miles per hour; larger boats with powerful engines may attain a speed of twenty-five to fifty-five miles per hour. Specially built motor boats for racing have attained a speed of 110 miles per hour.

A racing type of motor boat is equipped with sets of wooden wings on the sides, slightly tilted upwards towards the bow, to lift the boat from the water when in motion. With such devices a speed of over fifty miles an hour has been attained.

MOTORCYCLE, a bicycle which is propelled by a small gasoline motor, equipped at the present day with two or four cylinders. As early as 1868 a steam bicycle was invented, and from that time there was constant effort to produce a practical machine which could be driven without effort on the part of the rider. The first motorcycles really worthy the name appeared in 1900, and since that date they have grown enormously in popularity.

The modern motorcycle is made heavier than a bicycle, that it may stand the strain of the engine and of the speed at which it travels. The average machine can easily be run at a speed exceeding fifty miles an hour; most riders on safe roads go at the rate of forty to fifty miles an hour. The two-cylinder machines require but a gallon of gasoline for every fifty miles traveled; most motorcycles are of the four-cylinder type.

The motor is much like that of the automobile, though it is small and built very compactly. It has the necessary carburetor, fuel and oil tanks, clutch, throttle, magneto, muffler, spark plugs, etc. The motor is always air-cooled, a mechanical triumph not found generally popular in automobiles; air cooling has been applied to two types of cars.

Related Articles: Consult the following titles for additional information:

Bicycle Carburetor Gas Engine

MOTT, LUCRETIA COFFIN (1793-1880), an American woman's rights advocate, born on Nantucket Island, educated in a Friends' School near Poughkeepsie, N. Y. and later chosen a minister in the Society of Friends. She and her husband were ardent supporters of emancipation and were members of the Anti-Slavery Society. Because Mrs. Mott was excluded with other women from the World's Anti-Slavery Convention in London, she and Elizabeth Cady Stanton began to discuss woman's rights and brought the subject before a convention at Seneca Falls, N. Y. Mrs. Mott was not only interested in abolition and woman's rights, but in temperance, the subject of permanent universal peace and many other questions concerning the uplift of mankind.

MOULDS. See **MOLDS**.

MOULTRIE, *mole'tri*, WILLIAM (1731-1805), an American soldier, born in South Carolina. Though associated with loyalists, he early espoused the patriot cause in the Revolution, entered the South Carolina provincial congress, took command of a regiment of state militia and defended Charleston against an attack by Sir Henry Clinton, in March, 1776. For his service in repulsing a fierce attack by the British fleet under Parker, he was thanked by Congress, and the fort which he had built on Sullivan Island was named Fort Moultrie. He was also made brigadier-general, was given command of the army in the states of Georgia and South Carolina and was active in defending this territory. He was captured at Charleston in 1780, but was exchanged, and was made a major-general. He published, in 1802, *Memories of the Revolution*. He was chosen governor of South Carolina in 1785 and again in 1794.

MOUND BIRD, one of a group of fowls which have the common habit of building, for a nest, a large pile of vegetable matter, which, by the heat of its decay, hatches the

eggs that are distributed through it. The young are quite strong when hatched and make their way out of the pile of refuse and shift for themselves. The birds return to the same nesting place year after year, increasing the size of the mounds, and it is probable that several females use the same heap. The mounds vary in size and character with the species that builds them. The mound birds are principally natives of Australia, though some species are found in New Guinea and other islands. The Australian brush turkey is one of the largest and best known.

MOUND BUILDERS, the name given to the people who built the artificial hillocks or mounds which exist in the valleys of the Mississippi, the Ohio, the Missouri and their tributaries. The mounds are of earth or sand, round, oval, square and in some cases polygonal or triangular, varying greatly in height and size. Sometimes they are erected on the summit of a hill; sometimes they stretch irregularly across the plains.

The most important mound still in existence is that of Cahokia, in Illinois. This rises in the midst of about sixty others in four successive terraces, reaching an elevation of ninety-one feet and covering a surface of twelve acres. Some of the mounds appear to have been defensive works, others to have served for ceremonial purposes, and many were certainly burial places. The effigy mounds are the most curious. These are of diverse forms, grouped without any apparent order, representing men, quadrupeds, birds and reptiles. The most celebrated of these effigy mounds is the Serpent, on a hill overlooking Brush Creek, Adams County, Ohio. It now belongs to the Peabody Museum and is enclosed in a public park. The folds of the serpent give a length of 700 feet; in the mouth is an egg, represented by an elliptical mound, the large axis of which measures 160 feet.

Many of the mounds have been opened and have been found to contain pottery, weapons and other articles of primitive culture. The pottery was made of clay, dark gray in color, often with a shade of blue in it. Some of their vessels have a capacity of over ten gallons, others of several quarts. Some of the pottery is painted. Among the articles obtained from the mounds were necked vases; cooking vessels, sometimes provided with a cover and nearly always with handles; lamps,

generally of black pottery; tureens or basins; cups, and pipes. At Mound City, Ill., four pipes were found, with human profiles of a singularly characteristic type. One pipe, representing a woman, will stand comparison with the Mexican sculptures, while one was found in Indiana representing on its opposite faces a death's head and the head of a goose.

The weapons discovered in the mounds consist mainly of arrowheads, made of quartzite, jasper, granite and many other kinds of stone, highly polished. Among the ornaments found are pearls, shells, perforated teeth of animals, bones of small birds, claws of wild beasts, rings and earrings of copper, the last sometimes covered with a film of silver.

Some writers claim that the present-day Indians are the descendants of the Mound Builders, which is probably not true; others hold that the race which raised the great mounds has disappeared, and that no additional information will ever be gained regarding these strange people.

MOUNTAIN, a mass of earth and rock rising in rugged majesty, higher than a hill, above the surface of the globe. An elevation of land ceases to be a hill at 2,000 feet elevation. Mountains are usually found in groups, systems, ranges or chains, though isolated mountains, due to volcanic action, are also found. The elevation of great mountain masses is due to movements of the earth's crust, but mountains of considerable mass have also been carved out by erosion. The highest mountain in the world is Mount Everest, one of the Himalayan range, which is 29,141 feet above the level of the sea.

There are three important methods of measuring mountains, namely, by the barometer, by observation of the boiling point of water, and by calculation from data procured by accurate surveying instruments, the necessary formulae being supplied by trigonometry. This last is by far the most accurate method. See PLAIN; PLATEAU.

The Highest Mountains. The world's nine highest peaks are in Asia; the next highest are in South America. Mount McKinley, in Alaska, is the highest in United States' territory, and Mount Whitney (14,502 feet), in California, is the most elevated in the United States proper. Following is a list of peaks with elevations exceeding 20,000 feet:

ASIA			
Mt. Everest	...29,141	Mercedario	...22,315
Godwin-Austen	28,280	Huascarán	...22,188
Kunchinginga	28,156	Anconhuma	...21,490
Gusherbrum	...26,378	Illampu	21,192
Dhawalagiri	...26,826	Huandoy	20,847
Kutha Kangir	24,740	Illimani	21,030
Nanda Devi	...25,600	Pamiri	20,735
Mustaghata	...24,400	Chimborazo	...20,498
Chumalari	...23,946	Tupungato	...20,286
SOUTH AMERICA		NORTH AMERICA	
Aconcagua	...22,834	McKinley	20,300

MOUNTAIN ASH, a small tree of the rose family, distributed throughout Europe and North America. It is found mostly in high latitudes and the higher altitudes of more temperate regions. Of dwarfish growth, it is rarely more than thirty feet in height, and often occurs as a shrub. The graceful foliage, in some species compact, clusters of white flowers and red berries make it one of the most valued of ornamental trees. The wood of some species is very hard and is useful for making tool handles and other small implements, while the berries furnish food for birds.

MOUNTAIN LAUREL. See **KALMIA**.

MOUNT DESERT ISLAND, now Acadia National Park. See **PARKS, NATIONAL**, for description.

MOUNT STEPHEN, George Stephen, First Baron (1829-1921), a Canadian financier, born at Dufftown, Scotland. At an early age went to London, but emigrated to Canada in 1850 and entered his uncle's establishment in Montreal, later forming a partnership with him. In 1860 he purchased his uncle's interest in the business and entered largely into the manufacture of woolen goods. He was elected a director of the Bank of Montreal, and in 1876 was chosen president of that institution. From its organization until 1888 he was president of the Canadian Pacific Railway, and the successful completion of that gigantic enterprise is due largely to his energy, foresight and faith in the future of Canada. As a reward for his services in connection with the building of this railway, the queen created him a baronet of the United Kingdom in 1886, and in 1891 raised him to the peerage as Baron Mount Stephen.



LORD MOUNT
STEPHEN

MOUNT VERNON, *vur'non*, the home and estate of George Washington, in Fairfax County, Va., on the right bank of the Potomac, fifteen miles south of Washington, D. C. The mansion was built in 1743 by Washington's brother Lawrence, and it was named after Admiral Vernon of the British navy. Washington's tomb is on this estate, a few hundred yards from the house, near a picturesque ravine. Washington bequeathed the estate to Bushrod Washington, who in turn left it to his nephew, from whom it was purchased in 1858 by the Ladies' Mount Vernon Association, and it is carefully maintained for its historic interest.

MOURNING, a term applied to some visible sign of grief for the dead. A generation ago it was the almost universal custom in Western nations to wear black garments for months after the passing away of a loved one. While this practice is still followed by some, the tendency is to modify it or do away with it altogether. The custom of wearing white to funerals is preferred by many; others wear no mourning at all. Physicians advise against the use of black because of its gloomy associations. In ancient times various other ways of showing grief were common. The Jews of Old Testament times rent their clothes and put on sackcloth and ashes; the Greeks shaved their heads and the Romans went about in disordered garments and with neglected beards and hair.

MOURNING DOVE. See **PIGEON**, subhead *Mourning Dove*.

MOUSE, a member of a group of small gnawing animals differing from the rat only in size. The house mouse, a pest only too familiar to the housewife, is found in various parts of the world. Wherever found it has the same description—large eyes and ears, long tail and characteristic gray color. The domestic cat is the most deadly enemy of the mouse. The *harvest mouse*, the smallest of quadrupeds, constructs a little globular nest of grass, entwined round and supported by the stalks of the corn or wheat. The common *field mouse* is a dusky brown, with a darker strip along the middle of the back, while the tail is of a white color beneath. The *short-tailed field mouse*, or *meadow mouse*, is not a true mouse, but is one of the voles. The dormouse (which see) is also of a different family. The jumping mice of America are closely related to the jerboas.



MOVING PICTURES. Beginning as a peep-show amusement, moving pictures now form an important art that entertains and instructs millions of people in all parts of the world. Audiences enjoy fiction dramas and comedies written especially for enactment before the camera by some of the foremost writers of the day, as well as screen adaptations of important novels and plays. They keep abreast of the world's progress by viewing news pictures that show important events like the inauguration of a new President or the launching of a ship. Because of their wide distribution, moving pictures comprise a powerful force that influences speech, styles, and manners. Through the pictures the people of one country become familiar with the dress and habits of other peoples.

Entertainment and Instruction. While the chief use of moving pictures is entertainment, the cinema is a valuable adjunct to many kinds of human endeavor. Used in schools, moving pictures are an aid to spoken instruction and carry to the students living pictures of far-off lands. Explorers like Byrd at the South Pole bring back vivid records of their travels. Naturalists photograph the habits of strange animals and insects. In science and industry moving pictures of important experiments and operations form permanent records for future reference. They aid in the spread of religious teachings, are a means of advertising, are exhibited by lecturers, and have even been used as a medium of political propaganda.

Beginnings of the Art. Although the principle of the moving picture, that of presenting a series of slightly changed pictures in front of the eye in rapid succession to simulate motion, had been suggested and attempted before, it remained for Thomas Edison in 1887 to devise what is regarded as the parent machine of the moving-picture art. This was the kinetoscope, a peep-show through which one viewed a series of pictures traveling on a belt, arranged so that each picture in turn came to a short rest to permit the eye to grasp the image. The crude de-

vice was improved by the use of roll film which was perfected two years later.

At about the same time, experiments by the Lumière brothers and by Armat and Latham resulted in projectors similar to magic lanterns, by which the moving film could be projected on a screen and thus be viewed by audiences of more than one. Photographic cameras were constructed by which photographs of moving objects could be taken in rapid succession. By the beginning of the twentieth century many simple moving pictures of people and animals in motion were being exhibited. Then, beginning with the *Life of an American Fireman* in 1903, the screen story, visual fiction, began development. Numerous improvements in technic, lighting, film, cameras, and projectors slowly lifted the art from its crude beginnings.

Technical Problems. Shortly after moving pictures were developed, attempts were made to make them "talk" by running off a phonograph record at the same time that the picture was shown, but many technical problems delayed the perfection of talking pictures until 1927, *The Jazz Singer* being the first "talkie" that attained popularity. Now nearly all important pictures have their sound accompaniments, delivering the conversations of the actors as well as incidental sounds. This has enabled the studios to reproduce operas in all their glory and to bring speaking images of national figures before audiences numbered in millions. At the same time it has greatly increased the value of educational and technical films, since spoken explanations may be delivered while the pictures are in motion.

Extent of Industry. Some 70 per cent of all moving pictures are made in the United States, and of these, 95 per cent are created in and around Hollywood, California. Other centers of the industry are in Europe, the Orient, and India. From Hollywood each year come about 500 feature pictures and close to 1,000 other shorter films, which are distributed to 19,000 theaters in the United States and also to other lands. In the United States approximately seventy million admis-



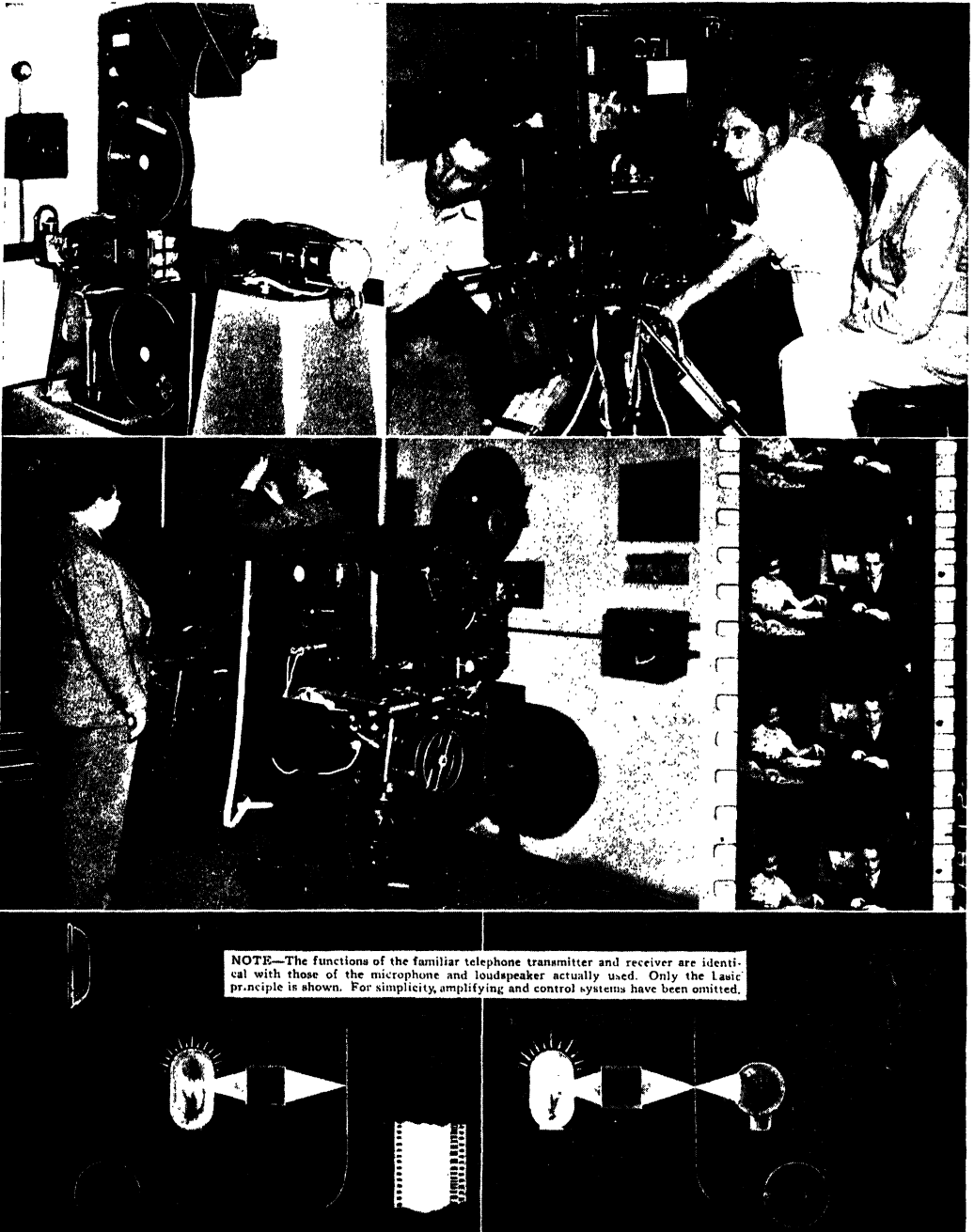
MOVIES IN THE MAKING

Top: Filming a picture inside a sound stage. Sound microphones visible overhead.

Left Center: Full scale ocean liner built on studio lot.

Right Center: Make-up artist at work.

Bottom: Shooting a scene on shipboard. Note large microphone for outdoor use.



Recording Sound (left): Microphone translates sound waves into electrical waves and controls flow of current to light bulbs, the intensity of which varies strength of sound impulses. These rays pass through lens and are focussed through narrow slit upon moving film, producing a photographic record of sound waves. *Reproducing Sound* (right): Beams from constant light are focussed through narrow slit upon sound track of moving film, producing intermittent flashes which react correspondingly upon photoelectric cell, which converts light flashes into electrical impulses and vibrates diaphragm of speaker, thus recreating original sounds.

Top, left: Making photographic record of sound; right: modern motion picture camera, in sound-proof enclosure. Middle, left: Sound projection booth; right: film, with sound track at right of pictures.

sions are sold by the picture theaters each week. The business of making and exhibiting pictures in America requires the services of 272,000 people, of whom 30,000, comprising 276 different arts and crafts, are employed in their making. The annual payroll of the studios is about \$76,500,000.

Combining Moving Scenes with Sound. Creating a moving picture is a complicated and expensive process, some pictures costing more than \$1,000,000 and requiring several years to complete. A sound picture needs the services of writers, actors, directors, cameramen, sound technicians, designers, and scores of other diversified workers. First a plot, possibly the adventures of a modern air-mail pilot, or a romance of the Crusades, is worked out and is given to a staff of writers for adaptation. Meanwhile backgrounds are chosen, costumes are designed and made, properties like ships or castles are chartered or built, and a cast of actors is selected. Careful research insures that such things as costumes accurately represent the place or period of the play.

The preliminaries of picture making take months, and the actual "shooting" of the story may be accomplished in a few weeks. Finally, the actors are assembled and rehearsed, then each scene is played before a camera while the sound men suspend a microphone above the players to catch their voices. The electrical impulses from the microphone are carried through a "mixing panel" that controls the volume of energy to a sound camera, where the impulses affect a beam of light exposed on a strip of moving film.

Some of the scenes may be played inside "sound stages," huge buildings insulated from outside noises so that no unwanted sounds may interfere with the voices of the actors. For other scenes the players go on "location"—to the ocean for sea pictures or to the mountains for snow scenes. After developing, the two negatives, one bearing pictures and the other the visual record of the recorded sounds, are edited and joined together to form a smooth sequence, after which positive photographic prints, also on film, are distributed to the theaters. By a reversal of the sound recording process the microscopic lines of the sound track are converted back into sound waves and are projected through loud speakers in the theater simultaneously with the showing of the pictures.

The technical departments have devised many short cuts by which some of the expense entailed by the huge sets and special scenery such as were used in former years is reduced. One of these, "process shots," is the use of another motion picture as a background. By filming actors in front of a motion picture screen on which a Shanghai street scene, for instance, is being projected, an authentic scene is obtained without leaving the studio.

Another popular short cut is the filming of many scenes in miniature, using scale models of ships or airplanes. Both of these devices, as well as stop motion, are used in creating fantastic yet realistic pictures in which giants tower over the other actors or in which whole cities may appear to burn. Stop motion, by which inanimate objects like dolls are made to move on the screen, is the basis of animated cartoons. Thousands of drawings, each one depicting a slight advance in action, are photographed one at a time on a strip of moving-picture film with the result that when the film is run through a projector the cartoon characters appear to move like living actors.

The Problem of Color. Like talking pictures, color represented many problems, and was a long time coming to the screen. After laborious attempts at painting colors directly on the small frames of film, a method was achieved by which colors are photographed at the time of filming through the use of color filters and several parallel strips of film in the camera. The three strips of film, each of which has recorded a different color of filtered light, are dyed in complementary colors and combined for preparing a single positive film in natural colors for use in a standard projection machine. Aside from the added realism imparted to the screen, this step enabled directors to express emotional moods through the use of colors, as the use of warm amber shades for romance and cold blue for tragedy. *Becky Sharp*, the first full-length color film, was exhibited in 1935. At the same time a simpler method of color photography by which three emulsions sensitive to separate colors are contained in the same film had been made available for small amateur motion-picture machines. Considerable progress has been made in processes to impart to the screen a three-dimensional effect so that moving pictures shall seem to have depth as well as width and height.

MOZAMBIQUE *mo zam beek'*, **CHAN-NEL**, the body of water which separates the island of Madagascar from the east coast of Africa. It is about 1,000 miles long and ranges in width from 250 to 600 miles, being narrowest in the middle. At the north entrance to the channel lie the Comoro Islands. A warm current flows through this channel which, on striking the shallows of the African coast to the south, produces one of the roughest seas in the world. The chief ports on the Channel are Beira, just north of which is the mouth of the Zambezi River, and Mozambique. The channel at Mozambique is twenty-eight feet deep. It is lighted by beacons on buoys, but there is a light-house on a nearby island.

MOZART (German pronunciation, *mo' tsahrt*), JOHANN CHRYSOSTOMUS WOLFGANG AMADEUS (1756-1791), a German composer, one of the supreme masters of all time, and one of the most precocious geniuses who ever lived. At Salzburg, his native city, his father began to teach him music when he was little more than a baby, and when the boy was five years old he composed minuets. At six he was taken with his little sister on a concert tour of Europe and everywhere created a furore. At the age of seven Mozart published several sonatas, and at eight could play the difficult works of Bach and Handel. After 1769 he spent much time in Italy, and the influence of the Southern sojourns is largely responsible for the balance of melodiousness and sunshine with German seriousness and vigor which are characteristic of his compositions. Mozart contracted a happy marriage with a member of the illustrious Weber family, and this, together with the joy afforded by creative work, were the sole earthly recompense for a short life of hard work and poverty, embittered by the enmity of jealous rivals.



MOZART

Mozart's productivity was almost incredible. He produced forty symphonies, twenty-five piano concertos, six violin concertos, and forty arias with orchestral part. His chamber music includes twenty-six string quartets,

seven string quintets and forty-two sonatas for piano and violin. Those of his works most frequently performed are the operas *The Marriage of Figaro*, *Don Giovanni* and *The Magic Flute*; among sacred pieces, the immortal *Requiem*, the *Twelfth Mass* and the famous *Ave Verum*, and numerous sonatas, symphonies and pieces of chamber music.

MUCILAGE, *mu'si laje*, a jellylike preparation, made from vegetable gums and from starch. Many of the gums used for making mucilage exude from trees; some of them are found in the form of clear roundish tears, and some are obtained by extracting the mucilaginous substance from shrubs, quince, marshmallow and several others.

MUCUS, a clear, sticky fluid, secreted by mucous membranes, forming a layer of greater or less thickness on their surface. It covers the lining membranes of all the cavities which open externally, such as those of the mouth, nose, lungs and intestinal canal, and it is renewed with more or less rapidity. Besides keeping these membranes in a moist and flexible condition, it also protects them against the action of the air, of the food and of the different glandular fluids that might otherwise inflame them.

MUD HEN. See COOT.

MUD TURTLE. See TURTLE.

MUEZZIN, *mu ez'in*, a Mohammedan official who is entrusted with the task of calling the time for prayers. He stands on a balcony surrounding the tower, or minaret, of the mosque, or at the side of the building. Five times a day is the call made, beginning, "Allah is great." The periods of prayer, observed by every devout Mohammedan, are dawn, noon, 4:00 P. M., sunset and nightfall. See MOHAMMEDANISM.

MUG'WUMP, a term in common use in a past generation, given to a citizen nominally affiliated with a certain political party, but who often voted for other candidates. It was applied to the Republicans who voted the Liberal Republican ticket in 1872, but it became especially common in 1884, as applied to those who called themselves "Independent Republicans" and refused to vote for James G. Blaine. To-day independence in voting characterizes both local and national politics. Party affiliations mean less than ever before.

MUIR, JOHN (1838-1914), an American geologist, naturalist and explorer. He was born at Dunbar, Scotland, and emigrated with his family to America at the age of

eleven. He entered the University of Wisconsin in 1859, studied the courses in which he was most interested, and after four years left without taking a degree. During the next four decades he traveled over a large part of North America and visited many remote and interesting regions in other parts of the world, including Australia, New Zealand, India, Manchuria, Siberia, Russia and parts of South America and Africa. He journeyed on foot from the Great Lakes to the Gulf of Mexico, discovered the famous glacier in Alaska that bears his name, and spent six years exploring and studying the Yosemite region, which was created a National Park chiefly through his influence. Muir's earnest pleas in behalf of the preservation of American forests influenced Congress to pass conservation laws, and Theodore Roosevelt acknowledged his contribution to this movement. He was accustomed to keep a journal during his travels, and the observations thus recorded were the basis of material that appeared in many of his books. These include *The Mountains of California*, *My First Summer in the Sierra*, *The Yosemite*, *Picturesque California*, *Our National Parks*, *Steep Trails* and *A Thousand-Mile Walk to the Gulf*. He also wrote *Story of My Boyhood and Youth*.

MUIR GLACIER, one of the largest and best-known glaciers of Alaska, named for its discoverer, John Muir (see MUIR, JOHN). It is situated at the head of Glacier Bay, and has a frontage of nearly three miles and an altitude varying from 150 to 210 feet. Its highest point probably extends 1,000 feet above the bed of the ocean. The glacier extends up the mountains for more than fifteen miles and covers an area of 350 square miles, but the actual area drained by it is estimated to exceed 800 square miles. The front presents a vertical or overhanging cliff, resembling in structure rugged, waterworn rock. From this cliff icebergs are constantly breaking and falling into the sea. See GLACIER.

MUKDEN, *mook'den*, or **MOUKDEN**, an important city of Manchukuo, capital of the province of Fengtien, about 400 miles northeast of Peiping. Within its walls are many important buildings, including the tombs of the early rulers of the Manchu dynasty of China. The city is connected with Port Arthur by the Southern Manchurian railway. During 1904 and 1905 several great battles were fought near Mukden (see RUSSO-JAPANESE WAR). In 1931, the Japanese army

occupied the city as the first step in organizing Manchukuo. Population, 421,000.

MULATTO, a person one of whose parents of the white, the other of the Negro, race. Loosely speaking, a mulatto is any person having a mixture of white and Negro blood; however, the child of a white person and a mulatto is properly called a *quadroon*, and the offspring of a quadroon and white person, whose blood is seven-eighth white and one-eighth Negro, an *octoroon*.

MULBERRY, a genus of trees and shrubs distinguished by large leaves and fruit which in form and structure resembles the blackberry. These trees originated in Persia. Of the several species, the *common black mulberry* is the best known and has been cultivated for centuries because of its fruit, which is used as dessert and also preserved in the form of a syrup or light jelly. The *white mulberry* is the most interesting, because it furnishes food for silkworms. This



MULBERRY

tree has been introduced to some extent into the United States, in the hope that the raising of silkworms might become profitable. As yet, not much progress has been made.

The *red mulberry* bears a fruit of a rich, deep-red color. The *paper mulberry*, now much cultivated, belonged originally to Japan, where its bark is used in the manufacture of paper. The *Russian mulberry* is a small, hardy shrub that grows very rapidly and has been introduced into the Western United States as a hedge plant. See SILK.

MULE, a beast of burden, the offspring of a male ass and a mare. The animal has long ears, bushy tail, short mane and pointed hoofs. It has unusual powers of endurance, is rarely attacked by disease and is long lived. Mules are extensively bred in the Southern states, in Mexico and Spain. There are about 4,000,000 of these animals in the United States. They are most numerous in the ranch and plantation regions of the South and Southwest, where their great value is fully recognized.

MULLEIN, *mul'lin*, a large coarse weed, which produces both leaves and flowers on a single upright stalk. The leaves are large, and are covered with a whitish fuzz. The stalk terminates in a spike of yellow flowers. Of 100 known species, three are widely distributed in the United States—white, moth and common mullein. The average height of the plants is three feet. Formerly used for certain medicinal purposes, the plant is now regarded as not only without practical utility, but as a nuisance.

MULLENS, or **MULLINS**, **PRISCILLA**, the heroine of Longfellow's poem *The Courtship of Miles Standish*. With her parents and brother she was one of the colonists who came in the *Mayflower*. Her parents and brother died during the first winter at Plymouth, and soon afterward she married John Alden. Eleven children were born to them, and among their descendants was the poet Longfellow. See **ALDEN**, **JOHN**.

MÜLLER, **FRIEDRICH MAX** (1823-1900), a celebrated German philologist, son of the poet Wilhelm Müller and commonly known as Max Müller. He attended the University of Leipzig, and there studied Sanskrit. One of his earliest scholarly undertakings was a translation of the *Hitopadesa*, a collection of Sanskrit fables. In 1846 he went to England and established himself at Oxford, where he became professor of modern languages, a position which he held until his death. He was a foreign member of the French Institute and received the degree LL.D. from Cambridge and Edinburgh. His numerous writings included an edition of the *Rig-Veda*, a translation of ancient Sanskrit literature, *Science of Language*, *Chips from a German Workshop*, *On the Origin and Growth of Religion*, *Selected Essays*, *The Science of Religion* and *Natural Religion*; and he was the editor of the series of *Sacred Books of the East*, published by Oxford Uni-

versity. Although professor Müller advanced few original ideas, by reason of his enthusiasm, poetic imagination and readable style, he did more than any other scholar to awaken interest in the science of languages.

MULLET, one of a family of fishes extensively used for food. The mullets are nearly cylindrical in shape, have large scales and two fins on the back, far apart. They inhabit all warm waters and abound plentifully in the Mediterranean and in the Gulf of Mexico. At certain seasons they swim in shoals near the surface and are caught in nets. The *striped mullet*, considered the best, is the largest, weighing from ten to twelve pounds. It is successfully raised in ponds. Botarcha, made from mullet roe, is a favorite condiment in Southern Europe.

MU'LOCK, **DINAH MARIA**. See **CRAIK**, **DINAH MARIA MULLOCK**.

MULTIGRAPH. See **COPYING DEVICES**.

MUM'MY, a dead body embalmed and dried after the manner of those taken from Egyptian tombs. An immense number of mummies have been found in Egypt, including not only those of human bodies, but of various animals, as bulls, apes, ibises, crocodiles and fish. They are yellow in color and light in weight. The processes for the preservation of the body were various. The bodies of the poorer classes were merely dried by salt of natron, a mixture of salt, saltpeter and sodium sulphate, wrapped up in coarse cloths and deposited in the catacombs. The bodies of the rich underwent the most complicated operations and were laboriously adorned with all kinds of ornaments. Embalmers of different ranks and duties extracted the brain through the nostrils and removed the entrails through an incision in the side; the body was then washed and salted, and after a certain period, the process of embalming, properly speaking, began.

This consisted, in general, in steeping the body for seventy days in a strong solution of natron. It was then washed and wrapped in linen bandages; each finger and toe was separately enveloped or sometimes sheathed in a gold case, and the nails were often gilded. The bandages were then folded round each of the limbs and, finally, round the whole body, to the number of fifteen to twenty thicknesses. The head was the object of particular attention; it was sometimes enveloped in several folds of fine muslin, the first glued to the skin, the others to the first,

and the whole was then coated with a fine plaster. Mummies have been found in Peru and in Mexico, but they are much less carefully preserved. Natural mummies are frequently found preserved by the dryness of the air. See EMBALMING.

MUMPS, a contagious disease of the salivary glands, which is accompanied by swelling along the neck, extending from beneath the ear to the chin. It may appear on one side of the face only, on both sides of face or first upon one side and then on the other. The premonitory symptoms are a soreness and stiffness of the jaw, with pain in the ear, which is soon followed by the swelling. Usually no treatment is necessary, except to keep the bowels regular and to protect the face from exposure to the cold. For several days after the swelling has subsided, a cold is liable to produce serious complications. Mumps occurs at any period of life between infancy and old age. It is a common childhood ailment.

MUNCIE, *mun'si*, IND., the county seat of Delaware County, fifty miles northeast of Indianapolis, on the White River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Pennsylvania, the Chesapeake & Ohio, and the Nickel Plate railroads, all of which are connected by a belt line. There is an airport. There are five electric railroads. The surrounding region contains deposits of natural gas and coal. The city has iron and steel works, glass factories, flour mills, canneries and manufactures of electrical appliances, mayonnaise, glass, oil engines and clothing. The city leads in the manufacture of glass fruit jars. It contains a conservatory of music, a parochial school, a courthouse, a city hospital, a public library and a Federal building. Population, 1920, 36,524; in 1930, 46,548.

MUNDELEIN, *mun'de lin*, MOST RT. REV. GEORGE W. (1869-), a Roman Catholic prelate, whose appointment as archbishop of Chicago, made him the youngest American Catholic holding such rank, and placed him in charge of the most populous diocese of the Roman Catholic Church. He was born in Brooklyn, N. Y., and educated at Manhattan College, N. Y. and at the College of the Propaganda, Rome. He was ordained priest in 1895, appointed monsignor ten years later, and in 1906 was honored with membership in the Ancient Academy of the Arcade. Three years later came his appointment as

auxiliary bishop of Brooklyn, and in 1915 to the archbishopric of Chicago. He was created cardinal in March, 1924.

MUNGOOSE. See MONGOOSE.

MUNICH, *mu'nik*, GERMANY, the capital of Bavaria and one of the chief German centers of art and learning. It is situated on an extensive plateau, about 1,700 feet above sea level, chiefly on the southern bank of the Isar. The old town has a quaint and irregular aspect, but the new town, which has sprung up chiefly to the north and west, has a regular and imposing appearance, and altogether Munich is one of the finest cities in Germany. The center of the life of the city is the Max-Joseph-Platz. Here is located the royal palace, which forms a very extensive series of buildings, chiefly in the Italian style, and contains many magnificent apartments and artistic treasures. Connected with it are the court church and the court and national theater, one of the largest in Germany.

Munich is famous for its art galleries, especially the Old Pinakothek, or Museum of Painting, and the New Pinakothek, the Glyptothek, or Museum of Sculptures; the Kunstgewerbehaus, or Industrial Art Building, and the Schack Gallery. The great Bavarian National Museum is world-renowned. The royal library has over 1,300,000 volumes and is one of the richest libraries in the world. The university is normally attended by over 4,000 students and has a library of over 400,000 volumes. The city also possesses an academy of science, an academy of arts and many fine churches, including the cathedral, which dates from the fifteenth century. There are many beautiful monuments in Munich. The so-called English Garden is a fine park of over 500 acres, watered by two arms of the Isar. In 1917 there was opened in Munich the largest hospital for women in Germany. Brewing is the chief industry, and immense quantities of beer are exported. There are manufactures of leather, gloves, jewelry, glass, carriages and musical instruments; and the mathematical, optical and surgical instruments made in Munich are famous throughout the world. In the spring of 1919 the city was the scene of serious disorders due to attempts to set up a soviet government. Population, 1925, 686,000; 1933, 735,388.

MUNICIPAL, *mu nis'e pal*, **GOVERNMENT**, the government of a city, town, village or other minor civil division of a state.

It is most often applied in common speech to the administration of the affairs of a city. The municipality is chartered as a separate governing body by the state and represents the state at the same time that it conducts the special activities of the city itself. For instance, in the matter of charity, the exercise of the police power, sanitation and the administration of justice, it is the agent of the state as well as of the city or village.

Government by Mayor and Council. Municipal government as organized generally throughout the world is administered in the majority of cases by a mayor and a common council, through executive boards, partly responsible to the mayor, partly to the council and partly exercising independent functions.

The mayor is elected by the people in the United States and Canada, but often by the council in some European countries. He is the head of the executive department of government and has the appointment of a large number of officials. The council may consist of one or of two houses. In the latter case the lower house is usually chosen directly by the people by districts; or wards; the upper house may be chosen by larger districts or for the city at large, or it may be especially appointed by the whole council from its own number. The councilmen, called aldermen, represent the wards, and there are two from each ward. In the hands of the council are most of the legislative functions, though the mayor usually has a veto power over its measures.

The above applies to a city government. A village is not divided into wards, but all the voters choose a village president and six trustees for two-year terms.

Commission Form of Government. A radical departure from the system above described, where authority is in the hands of many officials is a comparatively new scheme of control, under which the affairs of a municipality are entrusted to no more than five men. This enlightened form of administration is described elsewhere.

City Manager. The newest plan for centralizing responsibility in city affairs is found in the appointment of city managers. See list below.

Related Articles. Consult the following titles for additional information:

Alderman	Commission Form of
City	Government
City Manager	Mayor
	Municipal Ownership

MUNICIPAL OWNERSHIP, in general, ownership of anything by a municipality. The term is specifically applied to the ownership of public utilities, such as waterworks, lighting plants and street railways. There is a division of opinion as to the expediency of a city government managing other than the most necessary functions of government, such as the protection of property and the public health. In the United States, in 1800, there were fifteen private waterworks plants and one public; at the end of the century there were more than 1,700 public plants and fewer than 1,500 private. The number of waterworks plants now owned and operated by the municipalities exceeds 6,900; of all public utilities these seem easiest to manage. About 2,600 cities own their electric-light systems. As to other utilities there is more disagreement; only about 110 cities in the United States own their gas works; four percent, their sewage disposal plants; not more than about twenty cities, their street railway system. The other utilities, such as telephones, ferries, subways and public markets, are owned by cities in a few scattered instances.

In Great Britain and Ireland the proportion is even greater in favor of public ownership, and in Canada almost all of the cities own their own water plants. Canada is far more advanced in municipal ownership of public utilities than is the United States. See MUNICIPAL GOVERNMENT.

MUNKACSY, *mun kah'che*, MIHALY (1844-1900), a Hungarian painter whose real name was MICHAEL LIEB. He was born at Munkacs. After hard work and privations he was enabled to study at Gyula, Vienna, Munich and Düsseldorf, and in 1872 he settled in Paris. Among his best-known pictures were *Last Day of a Condemned Man*; *Milton Dictating Paradise Lost*; *Christ before Pilate*, his most famous picture; *The Crucifixion*, and *The Last Moments of Mozart*. Several examples of Munkacsy's art are in public and private galleries in America.

MUNROE, KIRK (1850-1930), an American writer of books for boys, was born near Prairie du Chien, Wisconsin. He studied civil engineering at Harvard, and afterwards while working on the routes of the Northern and the Southern Pacific railways gained information and experience of western life which fostered a love of adventure and later led him to give his attention to

literature. For a time he did newspaper work in New York City and was the first editor of *Harper's Young People*. Since his marriage, to a daughter of Amelia Barr, the novelist, he has made his home in Florida. His books are wholesome in tone, but not always historically accurate. They include *The Flamingo Feather*, *At War with Pontiac*, *Dory Mates*, *The Belt of Seven Totems* and *The Outcast Warrior*.

MUNSEE, the most warlike group of the Delaware Indians, and the natural leaders of the tribe in all their councils. They were prominent in the early history of New York and New Jersey, but are now widely scattered throughout the United States and Canada. The Munsee are also called Wolf tribe, because the wolf was their symbol.

MUNSEY, FRANK ANDREW (1854-1925), an American magazine and newspaper owner, who contributed much to the discussion of public questions. He was a "self made" man. His first employment was in a country store, then he became a telegrapher in Augusta, Maine, the home of numerous cheap magazines. He founded there the *Golden Argosy*, which, moved to New York, became the *Argosy Magazine*. He also established *Munsey's Magazine*, the *Railroad Man's Magazine* and the *All-Story Weekly*, and later purchased the famous New York *Sun*, the Baltimore *News*, and other newspapers. Munsey wrote several books, but none of special merit. He was decorated by the French government in 1919.

MURAT, *mu rah'*, JOACHIM (1767-1815), a French marshal and king of Naples from 1808 to 1815, was born the son of an inn-keeper near Cahors. He early chose a military career and rose rapidly. Under Napoleon in Italy and Egypt he rose to the rank of general. Napoleon gave him his sister Caroline in marriage. On the establishment of the Empire honors were showered upon him. Marshal of the Empire, Prince of the Imperial House and Grand Admiral were among the titles he received. He rendered distinguished services in the battle of Austerlitz, Jena, Eylau and Friedland, in 1808 commanded the French army which occupied Madrid, and in the same year was proclaimed king of Naples under the title Joachim I. He shared the reverses of the Russian campaign in 1812, and in 1813 again fought for Napoleon, whose cause he deserted, however, after the Battle of Leipzig. He took up

arms again in 1815 for Napoleon, but was defeated and forced to leave Italy. After the overthrow of Napoleon he escaped to Corsica, and later set sail for Naples in a foolhardy attempt to recover it. He landed at Pinzo, but was immediately captured, tried by a court martial and shot.

MURATORE, *mu'ra tohr*, LUCIEN (1878-), a French tenor, one of the foremost of present-day opera singers. After completing a course in the musical conservatory of Marseilles, his native city, he went to Paris and soon appeared with Calvé in *La Carmélite*. From that time onward his career was a brilliant success. In America he has appeared for several seasons as a member of the Chicago Grand Opera Company. His rôles include Faust, Romeo, Walther, Don José. His wife, Lina Cavalieri, is a well-known dramatic soprano.

MURCIA, *moor'the ah*, SPAIN, in the southern part of the country, capital of the medieval kingdom and modern province of the same name. It is situated on the River Segura, thirty miles north-northwest of Cartagena, and about twenty-five miles west of the Mediterranean Sea. Among the public buildings, the most important is the cathedral, with a façade which is a combination of Gothic and Romanesque architecture and which dates from the latter half of the fourteenth century. The episcopal palace is one of the finest in Spain. There are manufactures of woollens, silk stuffs, hats and gloves, powder, soap and musical instruments.

Population, 1921 census, 141,175; 1934, 164,044.

MURDER, the act of killing a human being with premeditated malice. To establish the charge of murder it must be shown that the person committing the act was of sound mind and descretion at the time. The old common law rule, which classed together all murders, however their circumstances differed, and punished all the same, has been changed by statutory enactments, murders being divided into three classes, or degrees, according to the degree of moral culpability.

Murders of the first degree are those resulting from specific intent or from the commission of felony. The penalty is usually death or life imprisonment. Murder is distinguished from *manslaughter* by the absence in the latter of malice or evil intent. Manslaughter may result from accident, or may be due to neglect or to misdemeanors, in

which case the crime is *involuntary* manslaughter; if it arises from sudden intent, due to sufficient provocation, it is classed as *voluntary* manslaughter. Punishment for either varies from five years' to twenty-five years' imprisonment.

Related Articles. Consult the following titles for additional information:

Crime	Felony	Homicide
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MURFREE, MARY NOAILLES (1850-1922), better known by her pen name, **CHARLES EGBERT CRADDOCK**, was a gifted writer whose stories of Southern mountain life are a genuine contribution to American literature. A native of Tennessee, she spent much time among the curious primitive folk of the Cumberland mountains and she wrote of them with keen sympathy and understanding. Her keen perception and familiarity with her subject are evidenced in such stories as *The Prophet of the Great Smoky Mountains*, *The Phantoms of the Foot-Bridge*, *A Spectre of Power* and in the collection, *In the Tennessee Mountains*. Among her latest books are *The Frontiersman*, *A Mountain Romance of Tennessee* and *The Story of Duncihurst*.

MURFREESBORO, BATTLE OF, or **STONE RIVER, BATTLE OF**, a battle fought near Murfreesboro, Tenn., Dec. 31, 1862, and Jan. 2, 1863, between a Federal force of about 41,000, under General Rosecrans, and a Confederate force of about 35,000, under General Bragg. Rosecrans was the aggressor, advancing from Nashville against Bragg's position at Murfreesboro. The opposing generals both planned to open battle on the morning of the thirty-first, and each intended to begin a vigorous assault upon the enemy's right wing. The Confederates were at first successful, the Federal offensive being converted into desperate defensive. After an all-days fight the Federals retained their position, though with fearful loss of men and guns. On the morning of January 2 the Confederates again opened a vigorous attack upon the Federal position, but did not gain any important advantage and at night withdrew. The net result of the battle was nothing more than a strategic advantage for the Federals.

MURIATIC ACID. See **HYDROCHLORIC ACID**.

MURILLO, moo ree'yo, **BARTOLOMÉ ESTÉBAN** (1617-1682), one of the greatest of Spanish painters, was born at Seville. Penniless, he walked from Seville to Madrid in

1642, and was fortunate enough to establish a friendship with Velasquez, who gave him shelter and procured for him permission to copy the masterpieces of the Royal Gallery. After six years he returned to Seville, where he married a wealthy lady; in that city he remained the rest of his life. He founded the Academy of Seville and became the head of the Seville School of painters. Unspoiled by wealth and fame, his style continually improved, his technic becoming more finished and his conception more idealistic.

Early in his career Murillo had painted with much skill and charm many pictures of humble life—ragged street urchins, vendors and the like; in his later years he did his best work on religious subjects. The *Immaculate Conception* was a favorite subject with him, and he painted it no fewer than fifteen times. Examples of Murillo's work are to be seen in all the large museums of Europe. A few of his pictures have been brought to America. While not so great a master as Velasquez, Murillo was nevertheless an unusual genius, and his canvases, such as *Moses Striking the Rock*, *The Miracle of the Loaves and Fishes*, *Vision of Saint Anthony* and the several representations of the Holy Family have been an inspiration to millions.

MURRAY, LINDLEY (1745-1826), an American grammarian, born at Swatara, Pa., of Quaker parents. At the age of twenty-one he was admitted to the bar and acquired an extensive practice in New York City. During the Revolutionary War he engaged in mercantile pursuits with such success that he amassed a fortune. On account of failing health, he then went to England and purchased an estate near Holgate, where he passed the remainder of his life engaged in literary pursuits. He is most widely known as the author of *Grammar of the English Language*, which was long used as a text-book in the schools of England and the United States. He was also the author of a spelling book, English exercises and several other text-books.

MURRAY RIVER, the largest river in Australia. It rises in the Australian Alps, in Victoria, flows for a long distance westward, forming the boundary between Victoria and New South Wales, then passes into South Australia, where it takes a southern direction and flows into the sea, after passing through a large shallow area of water

known as Lake Alexandrina. There is a sand bar at the mouth which impedes navigation, but small steamers ascend the river for hundreds of miles. Its total length is about 1,500 miles, and its chief tributaries are the Murrumbidgee and the Darling.

MURRUMBIDGEE, *mur rum bi'ee*, a large river in New South Wales, Australia. It rises in the Australian Alps, flows in a westerly direction and into the Murray. Its total length is about 1,350 miles, and it is navigable in the wet season, for small steamers, about 500 miles, but at other times, because of its shallowness, is of little commercial importance. Its chief tributary is the Lachlan.

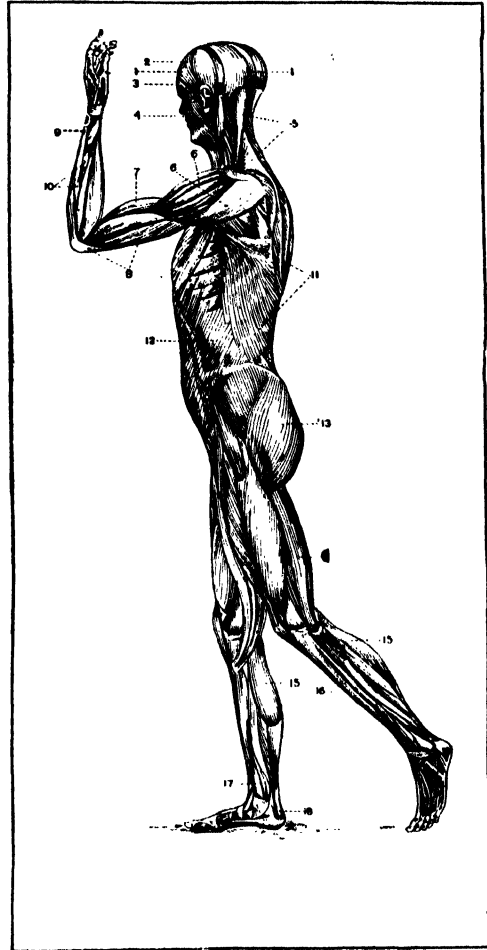
MUSCAT', MUSKAT, or MASKAT, the chief city of the sultanate of Oman, a seaport on the Indian Ocean, near the east angle of Arabia. The town stands in a hollow, under cliffs 400 or 500 feet high. The streets are extremely narrow, and the town is one of the hottest places in the world. It has an excellent port, and is an important center of trade, exporting coffee, pearls, mother-of-pearl, dye stuffs and drugs, and importing rice and sugar. Population, with Matrah, adjoining, about 13,000.

MUSCATINE, *mus ka teen'*, IOWA, the county seat of Muscatine County, on the Mississippi River, twenty-five miles below Davenport, on the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago Rock Island & Pacific and the Burlington, Muscatine & Northwestern railroads. There is an airport. The city has a bridge crossing the river. It is an industrial center, containing flour mills, pickle works, canning factories, foundries, machine shops, lumber mills, engine works, button factories and potteries. There is a considerable trade in lumber, fruit and agricultural and dairy produce. The city has several charitable institutions, two hospitals and the Musser Library. It was settled in 1833, and was incorporated six years later. Population, 1920, 16,068; in 1930, 16,778, a gain of 4 per cent.

MUSCLE, *mus'l*, or **MUS'CLAR TISSUE**, the flesh, or lean meat, of the body, making up about one-half its weight and forming the organs of movement.

Classes of Muscles. Muscular tissue exists under forms, the *striped*, or *striated*, and the *unstriated*. The latter is made up of elongated, spindle-shaped cells, about $\frac{1}{100}$ of an inch in length, each of which has, near its

center, a nucleus. The muscles composed of these fibers are called *involuntary*, because they are not under the control of the will. They receive their nerves from the sympathetic, or ganglionic, system (see **NERVOUS SYSTEM**). This tissue forms the muscular coats of the digestive canal, of the trachea and bronchi, of the blood vessels and lymphatics,



THE MUSCLES

1. Muscle of the scalp. 2. Temporal muscle.
3. The muscle that closes the eye. 4. Masseter muscle. 5. Trapezius. 6. Deltoid. 7. Biceps, the flexor muscle of the arm. 8. Triceps, the extensor muscle of the arm. 9. Extensor muscles of the thumb. 10. Extensor muscles of the wrist. 11. Broad muscle of the back. 12. Oblique muscle of the abdomen. 13. Gluteus. 14. The flexor of the leg. 15. Gastrocnemius. 16. The extensor of the toes. 17. The flexor of the toes. 18. Tendon of Achilles.

of the ducts of glands and of parts of the eye. It is found in the true skin, where its

contraction under the influence of fear or cold causes the roughness known as *goose flesh*.

Striated muscular tissue exists in bundles of fibers about an inch in length, which are enclosed in an elastic sheath of thin membrane, called the *sarcolemma*; and these bundles, supported and protected by connective tissue, penetrated by nerves from the cerebro-spinal system, freely supplied with blood vessels and bound in a sheath, make up the *voluntary* muscles, those under the control of the will. A few muscles of this class cannot be controlled, as those of the heart, the internal ear and the pharynx.

MUSCLE READING. See MIND READING.

MUSCLE SENSE, or **MUSCULAR SENSE**, the sense which forms the basis of our perception of the direction and operation of movements of the body and also the amount of muscular force necessary to accomplish a given act. The muscle sense lies in certain sensory nerves that are distributed in the muscular tissue and have their centers in the brain. The function of these nerves is to discharge nerve impulses to the motor nerves of the muscle. This sense is capable of being highly educated, and upon its proper training largely depends one's skill in any manual occupation. SEE MANUAL TRAINING; REFLEX ACTION; SENSES, SPECIAL.

MUSCLE SHOALS, the name of the great rapids in the Tennessee River, near Florence, Alabama. In the course of thirty-seven miles there is a drop of 134 feet. The shoal is famous as the site of a great water-power development, undertaken by the Federal Government during the World War, for the manufacture of nitrates for war purposes. Great dams were built at Muscle Shoals, one—the Wilson Dam—being the greatest concrete structure of its kind. A vast power plant was added, the cost of the entire enterprise rising to the enormous sum of \$165,000,000. The plant is capable of a development of over 600,000 horsepower.

In 1933 Congress passed a bill for the utilization of the Muscle Shoals plant and the development of the Tennessee River basin. The objectives of the plan are: production and distribution of cheap hydroelectric power, manufacture of fertilizer, regulation of flow of stream, and reforestation. See TENNESSEE VALLEY AUTHORITY.

MUSES, *mu'zez*, in Greek mythology, the goddess of all the arts and sciences. Original-

ly the muses were the nymphs of springs, especially the Pierian springs on the northern slope of Mount Olympus. In Homer they appear as the goddesses of song who sing at the banquets of the gods on Olympus. At first there seem to have been three muses, later nine. They sang to amuse the gods and in honor of great heroes among men. From the earliest times they were associated with the worship of Apollo, under whose direction they were supposed to sing. The early Greeks sometimes regarded the muses as the daughters of Uranus and Gaia, but later writers always speak of them as the children of Zeus and Mnemosyne (memory). Each presided over a branch of art or science—Calliope over epic poetry; Euterpe over lyric poetry; Melpomene, tragedy; Erato, erotic poetry; Thalia, comedy; Polyhymnia, or Polymnia, sacred hymns and pantomime; Terpsichore, choral song and dance; Urania, astronomy, Clio, history.

MUSEUM, *mu zé'um*, an institution for the exhibition of objects that have an immediate relation to literature, art, science and history. The term means *the home of the muses* and was originally applied to temples sacred to the muses; its present application is of comparatively recent date. Well-conducted museums are valuable educational institutions, and naturally they are promoted in all the leading countries of the world.

The first attempt to establish a museum on a large scale in the United States was in connection with the Smithsonian Institution (see SMITHSONIAN INSTITUTION). The success of this led to the establishment of the National Museum (see NATIONAL MUSEUM OF THE UNITED STATES). There are also museums of art and natural history in nearly all large cities. Among the most noted of these are four museums in Philadelphia, the Carnegie Institute at Pittsburgh, the Museum of Natural History and the Art Museum in Boston, Metropolitan Museum in New York and Field Columbian Museum and the Museum of Science and Industry (founded by Rosenwald) in Chicago.

In Canada there is a museum in connection with the department of education in Toronto, and in the same city is the Royal Ontario Museum, under the patronage of the University of Toronto. There are several museums and historical exhibits in Ottawa. Among those in Europe of special note are

the museum of the Vatican at Rome, that of the Louvre in Paris and the British Museum, the greatest in the world. See BRITISH MUSEUM; LOUVRE.

MUSH'ROOMS, the common name for numerous species of fungi, many of which are edible. Mushrooms are found in all parts of the world, and most species are of a very



TWO VARIETIES OF MUSHROOMS

rapid growth. Certain classes are commonly known as toadstools and puffballs. While many varieties are edible, some are deadly poisonous.

Description. The parts of a typical mushroom are the cap, the gills, the ring and the stem. The cap is the expanded top, frequently umbrella-shaped. The gills are the thin plates on the under side of the cap, usually extending from the stem to its circumference; they bear the spores by which the mushroom is propagated. The ring is a growth around the stem, just below the gills, and is formed by part of the covering of the cap, left when the mushroom expands into its perfect form. The stem may be wanting altogether, as in the case of puffballs, or it may be short and thick or long and slender. The cap also takes a great variety of forms, some of them fantastic in the extreme. In young plants of some species, the cap, before breaking away from the ring, resembles a button, hence growing mushrooms are often said to be in the "button stage." Mushrooms take a great variety of colors, ranging from pure white to the most brilliant or rainbow tints, and in some species several colors blend, making beautiful specimens when growing, but they soon wither when picked. Certain species are unpleasant or even disgusting in appearance, and all are clammy and cold to the touch. Some species growing on the trunks of trees become hardened with age, and one of these forms, the well-known *touchwood*, or *punk*, has the property of shedding light in the dark.

Mushrooms As Food. Edible mushrooms are cultivated for market in the United States and in many of the European countries. They thrive best in a moist atmosphere, from which bright sunlight is excluded. Gardeners usually grow them in beds of soil mixed with decaying horse manure. The beds are long and narrow and are usually covered, to protect them from the sun. The industry is very profitable, when successful. As an article of food, mushrooms contain but little nutrition and are regarded as a delicacy rather than a staple. Of the species commonly found in North America, the *golden peziza*, *clavaria formosa* and *polyporus* are edible; the *russulus* acts as an emetic, and the *fly* mushroom is poisonous.

Since it is difficult for those not thoroughly familiar with the species to distinguish between poisonous and edible mushrooms, these plants should never be eaten unless selected by some one whose knowledge can be relied upon. Any mushrooms whose stalks have a swollen base, surrounded by a saelike or scaly envelope, should be avoided, especially if the gills are white, as should those with a milk-white juice.



MUSIC, *mu'zík*. Longfellow in one of his poems said of music that it was "writ in the language spoken by angels." To the lover of music such a description seems more adequate than the one usually given—a succession of sounds which please the ear. Yet a series of notes is exactly what music is, and its tones reach our ear in the same way as do discordant sounds.

All sounds are the result of very rapid regular vibrations of some elastic medium, usually the air, set in motion by a sounding body, transmitted through the intervening space in the form of waves and striking the mechanism of the ear. If the vibrations are fewer than sixteen or more than 8,192 in a second the sound ceases to be a musical sound; it is mere noise. By variously combining musical sounds men create the melodies that are the "universal language of mankind"—cradle songs and patriotic an-

them, oratorios and symphonies, songs of home, of love, of war and of peace, in endless variety.

Importance of Music. Someone has said that "music is our fourth great material want—first food, then raiment, then shelter, then music." It may seem at first reading that this statement is an exaggeration. Surely a man can live without music, we think; and too surely the most of us do—without real music. But whether we recognize it or not the want is there; there is that in every one of us which calls for something that only music can supply. So large a part of our lives is of necessity spent in a rush and grind which almost inevitably dulls our finer sensibilities and blinds us to the better things of life that we owe it to ourselves to take time for those things which make for relaxation and for uplift. And among these uplifting agencies music certainly ranks with the first. It makes no attempt to instruct us, to tell us a story, to put facts before us. It simply appeals to the love for the beautiful and excites emotions of pleasure, and for these reasons it is considered the purest of the arts. For many people to whom religion makes no appeal, music is almost the only bond of connection with the world beyond the purely physical; and for all of us it may, as Carlyle says, "lead us to the edge of the infinite, and let us for moments gaze into that."

Nature and Terminology of Music. Musical tones vary in three respects—*pitch*, *intensity*, or loudness, and *timbre*, or quality. The pitch of a tone, or its relative position in a scale of high and low tones, is determined by the number of vibrations of the medium in a given time, a small number of vibrations producing a deep, or *low*, tone, a higher number producing an acute, *high*, or shrill tone. The intensity, or loudness, of a tone is determined by the size of the vibrations, loud tones being produced by wide vibrations in the medium, the soft tones by small vibrations. The quality of a tone depends upon the character of the substance which causes the vibration. For instance, the musical tone caused by the vibrations of a copper string differs in quality from one caused by the vibrations of the vocal cords of the throat. The element of a musical tone which is most commonly under the control of a performer is its pitch. Therefore, this subject will be considered in most detail.

Scales. Consider a tone produced by a

certain number of vibrations. The tone produced by double this number of vibrations will be in unison with it, though higher in pitch. Between these two notes are several other notes at different intervals of pitch, forming together a series more agreeable than any other. This series is known as the *diatonic scale*. There are eight of these tones, including the first and last. The interval between the first and last tones is therefore called an *octave*, and the intervals between the first and the second, the first and the third, the first and the fourth, etc., respectively, are known as a second, a third, a fourth, etc.

Each of the tones of the diatonic scale is given a name, to denote its absolute pitch, that is, its number of vibrations. These are the letters of the alphabet, beginning with A. The scale may be extended up or down, so long as the sounds continue to be musical, that is, so long as the additional tones are in the same relation, as to number of vibrations, as those of the original scale. The tone upon which the scale begins is said to be the *keynote*, or *tonic*, of the scale, and the letter which represents this tone is the name of the key upon which the scale is written. The fundamental key is the key of C. The following table shows the scale of C through one octave, with the number of vibrations which produce each of these tones, relative to the number which produces C, which is taken as 24 (middle C is in reality 256); also the names by which the tones of any scale, regardless of key, are called, in order:

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48
do	re	mi	fa	sol	la	ti	do

It is evident that if a scale is begun with the tone of E, the order of the intervals of the scale will not be in the order of the diatonic scale as given above. On most stringed instruments it is possible to produce the correct order by shortening and lengthening the vibrating string, as required. But on keyed instruments, such as the piano, this is impossible, and to obviate the difficulty a few intermediate tones are represented on the keyboard by black keys, known as the *sharp* and *flat* keys. These are placed at such intervals that a scale may be begun on any tone, and, by the proper insertion of the tones represented by the black keys approximately the proper intervals in order may be produced. However, to do this ab-

olutely, a vast number of keys would have to be inserted, so that in the pianoforte no key is usually absolutely correct. This accounts for the fact that violin music, in which the intervals of a scale can be more closely regulated, is more agreeable to the thorough musician than piano music.

Besides the forms of the diatonic scale, which has an interval of two tones between the keynote and the third and is called the *major* scale, there are so-called *minor* scales, of which the most important kind, known as the *harmonic minor*, has an interval of a tone and a semitone between its tonic and its third and has the seventh note *sharped*, or raised a part of a tone, in the ascending scale. Another form of minor avoids the harsh interval between the sixth and the seventh tones by sharpening the sixth tone. This is known as a *melodic minor*. In both forms the sharps are removed in descending, and the scale is identical with the major, beginning at the sixth tone. The minor which begins upon the sixth tone of a certain major scale is said to be a *relative minor* of that major scale. Thus, the scale of E minor is relative to the major scale of G and the relative minor of the major scale of C is A minor.

Notation. Every sound employed in the art of music may be represented by a character, called a *note*, written on a *staff*, that is, five equi-distant horizontal lines. A note represents a higher or a lower sound, according as it is placed higher or lower on this staff. When a note is higher or lower in pitch than any which can be placed upon the staff, short lines, called *ledger lines*, are added above or below the staff, to indicate the relation of the note to those written on the staff. Since the addition of numerous ledger lines is liable to confuse the eye, composers have made use of several staves, of which the most common are the *bass* and the *treble*, the former containing the lower notes. Each line and space of the staff corresponds to a note in the diatonic scale. Each line and space is therefore given a name corresponding to the name of the note for which it stands. The lines and spaces of the treble staff, beginning with the lower line and named in order, are E, F, G, A, B, C, D, E, F.

Sharps and Flats. In the writing of music upon the staff, in order to represent scales having any other keynote than C, it

is necessary to have symbols to represent the semitones as mentioned above, called *sharps* and *flats*. The sharp ($\sharp$), placed before a note, raises the pitch by a semitone; a flat ($\flat$) lowers it by a semitone. A sharp or flat placed at the beginning of a staff affects every note upon the line on which it is situated. A *natural* ($\natural$) is placed before a note to restore it to its normal or natural pitch, but it acts only through the measure in which it is situated.

Time. In the writing of music, each note upon the staff represents not only the pitch of the tone which it represents, but also the duration of the sound; this is always dependent upon the so-called *time* in which the composition is written. Every piece of music is divided into portions which are to be performed in equal spaces of time. These are called *measures* and are separated from each other, in writing, by vertical lines, called *bars*. The fixed standard of time length of the notes is a whole note ($\ominus$). This is divided into half notes, quarter notes, eighth notes, sixteenth notes, etc. Of these a certain number, or their equivalents, are to be used in each measure. At the beginning of every composition is the so-called *time signature*. This does not tell the absolute time to be consumed in the performance of a measure, but indicates, rather, the number of beats or units of rhythm which are to be marked off during its performance, these beats coming at equal intervals of time. The most common signatures are the following: $\frac{4}{4}$, $\frac{3}{4}$, $\frac{2}{4}$, $\frac{3}{8}$, $\frac{6}{8}$, $\frac{2}{8}$. In each of these, the upper number represents the number of beats to the measure, the lower represents the time value of each beat, that is, the kind of notes which form the units of time in each measure, or the time length of each unit note relative to the standard whole note.

The rate of speed is regulated by the performer or composer. Custom has decreed that compositions written with half or whole notes as unit notes be performed in slow, stately time, representative of dignity or reverence, and those written with smaller fractional notes as units be given in faster time, indicative of gaiety or emotion. Besides the notes on the lines and spaces of the staff, other signs are used to indicate the duration of the sounds. A dot placed after a note lengthens it by one half; a curve placed over two notes on the same degree of the staff indicates that they are to be played as

one and prolonged to the duration indicated by the two notes together. This is called a *tie*. When an interval of time is to occur between the sounding of two notes, a *rest* is introduced, notes of every time value having corresponding symbols for rests.

Symbols. Besides the pitch and duration of tones, the quality and intensity may be indicated in a musical composition by certain symbols, usually Italian words, of which the most common are, perhaps, *forte* (loud), *fortissimo* (very loud), *piano* (soft) and *pianissimo* (very soft). A large number of other phrases, indicating the emotion which the music is intended to arouse and the consequent quality of the tones which should represent the music, are used in every composition.

History. The history of music is naturally divided into two great periods, ancient and modern, distinguished by two facts; the ancients knew nothing of harmony, that is, of the results produced by sounding several notes together; they also knew nothing of a key. The oldest records of music are those of ancient Egypt, dating to about 4000 B. C., but the representations that have been found of the crude cymbals, drums, flutes and harps show conclusively that little progress had been made up to that time. Among the Hebrews and Assyrians the important phase of music was its religious significance, for it never attained among them the dignity of an art.

In India there are indications that the art of music had made some progress even in early times, but it was left for the Greeks to give the first great impetus to the study. Their music was inseparably linked with poetry. It consisted of a "sort of rhythmic diction," accompanied by coarse instruments, whose chief purpose was to accentuate the rhythm. That part of such a performance which we would call *music*, they distinguished by the name *harmony*. The Greeks also made the first systematic attempt to produce a system of permanent notation. The principal instrument among the Greeks was the lyre, later called the *cythara*. The Romans added little to the knowledge of musical art or science, but to them is due the construction of the first organ and the bagpipe.

The next epoch in the history of music begins with the rise of Christianity, the first great name being that of Gregory the Great, to whom is due the Gregorian chant, still used

in the Roman Catholic Church. After the time of Charlemagne, when the Saracens gained a foothold in southern France, their simple, emotional spirit became a lasting influence upon Western music. Somewhat later, in the North, the development of minstrelsy among the Celts and Saxons became an important force, keeping alive the love of music and carrying from place to place the best that was known. Writers of music became more numerous at this time; the monk Hucbald suggested counterpoint, and the use of the staff in notation. Adam de la Halle composed a work similar to light opera and developed the idea of harmony, while Guido d'Arezzo practically produced modern notation.

In the sixteenth century another revival took place, and among the names of musical importance of that time are Martin Luther, to whom the Christian Church is indebted for many beautiful chorals, and Palestrina, probably the greatest musical genius in Italian history. Shortly after, the first real opera was produced by Peri, who was followed by Monteverde, who gave to music the touch of imagination and ardor which it needed to bring it to popular esteem. Meantime, the construction of musical instruments was progressing, the violin, organ and clavichord were being perfected, and musicians were appearing to play upon them. From this time, then, all the elements requisite for growth were present—a knowledge of harmony, a musical notation, a diversity of instruments, and enthusiasm.

At this point its history separates into national channels, corresponding to the national spirit which was beginning to pervade literature and politics. The German school was characterized by its scientific accuracy, large themes and powerful use of instruments; the Italians sought for beauty, purity and striking melody; the French musicians sought to express strong, truthful emotion; the Russian school is notable for its picturesque, melodious and striking themes; the Scandinavians aimed to produce music of a stirring patriotic character, with emphasis upon rhythm rather than upon melody; the same may be said of the Bohemian school. In England the best work has been done in the fields of light opera and choral music. Of American composers, MacDowell attained international fame, but his works cannot be called typically American. There is, in fact, no

American school of music that represents the American nation of to-day. Of late years French influence has been dominant, and there is notable a tendency towards impressionism, as in painting.

Related Articles. Consult the following titles for additional information:

THEORY OF MUSIC		
Chord	Harmonics	Sound
Chromatic	Harmony	Tone
Counterpoint	Scale	Treble
CLASSES OF COMPOSITION		
Cantata	Hymns and	Opera
Gavotte	Hymn Tunes	Opera Bouffe
Hymns,	Minuet	Oratorio
National		Waltz
MUSICAL INSTRUMENTS		
Accordion	Fife	Oboe
Bagpipe	Flageolet	Organ
Banjo	Flute	Piano
Bassoon	Guitar	Pianoplayer
Bugle	Harmonica	Siren
Castanets	Harp	Tambourine
Clarinet	Horn	Trombone
Concertina	Hurdy-gurdy	Trumpet
Cornet	Jew's-harp	Viol
Cymbals	Lute	Violin
Drum	Lyre	Violoncello
Dulcimer	Mandolin	Zither

AMERICAN COMPOSERS

Buck, Dudley	Foster, Stephen C.
Chadwick, George W.	Herbert, Victor
Damrosch, Leopold	MacDowell, Edward A.
Damrosch, Walter J.	Nevin, Ethelbert
De Koven, Reginald	Root, George F.
Eddy, Clarence	Sousa, John Philip
Foote, Arthur	Thomas, Theodore

AUSTRIAN COMPOSERS

Dvorak, Antonin	Liszt Franz
Haydn, Joseph	Smetana, Friedrich

ENGLISH COMPOSERS

Balfe, Michael W.	Elgar, Edward W.
Coleridge-Taylor, Samuel	Sullivan, Arthur S.

FRENCH COMPOSERS

Auber, Daniel F.	Francck, Cesar A.
Berlioz, Hector	Gounod, Charles F.
Bizet, Alexandre C.	Massenet, Jules E.
Chaminade, Cecile L.	Offenbach, Jacques
Chopin, Frederick F.	Saint-Saens, Charles

GERMAN COMPOSERS

Bach, Johann S.	Humperdinck,
Beethoven, Ludwig	Engelbert
Brahms, Johannes	Mendelssohn-
Bülow, Hans	Bartholdy, Felix
Guido von	Mozart, Johann W.
Flotow,	Schubert, Franz
Friedrich von	Schumann, Robert
Gluck, Christoph	Strauss, Johann
Handel, George F.	Strauss, Richard
Henschel, George	Wagner, Wilhelm R.
	Weber Karl von

ITALIAN COMPOSERS

Bellini, Vincenzo	Palestrina,
Donizetti, Gaetano	Giovanni da
Mascagni, Pietro	Rossini, Gioachino
	Verdi, Giuseppe

OTHER NATIONS

Grieg, Edvard H.	Rubinstein, Anton G.
Paderewski,	Tschaikowsky, Peter
Ignace Jan	

SINGERS

Calve, Emma	Galli-Curci
Caruso, Enrico	Garden, Mary
Cavalleri, Lina	Gluck, Alma
De Reszke, Edouard	Homer, Louise
and Jean	Kellogg, Clara L.
Destinn, Emmy	Lauder, Harry
Eames, Emma	Lind, Jenny
Farrar, Geraldine	McCormack, John
Gadski, Johanna	Melba, Nellie

Muratore, Lucien
Nilsson, Christine
Nordica, Madame
Patti, Adelina

Schumann-Heink,
Ernestine
Tetrazzini, Luisa

VIOLINISTS AND PIANISTS

Bloomfield-Zeisler,	Paderewski, Ignace
Fanny	Jan
Elman, Mischa	Paganini, Niccolo
Kubelik, Jan	Powell, Maud

MUSK, a soft, reddish-brown powdery substance of powerful odor, found in a gland of the musk deer (which see). When the animal is killed the sac containing this secretion is cut off and dried before it is shipped to manufacturers. It is used to a certain extent in medicine as a stimulant and as an antispasmodic; but its chief commercial value is as a base for perfumery.

MUSKAT. See MUSCAT.

MUSKEGON, MICH., the county seat of Muskegon County, forty miles northwest of Grand Rapids, on Muskegon Lake, connected with Lake Michigan by a channel 200 feet wide, and on the Grand Trunk, the Pere Marquette and the Pennsylvania railroads. It has boat service to Milwaukee and Chicago. The city conducts a large trade in fruit, and garden products, raised for city markets, and has also flour mills, and factories making paper, furniture, pianos, motors, knit goods, refrigerators, and billiard tables. There is a manual training school, a public library, a gymnasium, two hospitals and a public square containing a soldiers' monument, all of which were gifts of Charles H. Hackley. There is also a 245-acre airport. Muskegon was settled in 1834, and was chartered as a city in 1869. Population, 1920, 36,570; in 1930, 41,390, a gain of 13 per cent.

MUSKELLUNGE, *mus keh lunj* (first or third syllable accented), also called MASKINONGE, from an Algonquin word meaning *great pickerel*, an excellent food fish and the finest and gamest member of the pike family. It may attain a length of five to eight feet, and weigh nearly a hundred pounds, though few are caught which are more than forty inches long. When caught, this fish is difficult to land, for it is very strong, extremely swift in its movements, and it fights ferociously. It is dark-gray in color, with darker spots over the top and sides of the body. It is found in the Great Lakes of North America and in the small lakes of Northern United States and Southern Canada. See *Pike*.

MUSKHOGEAN, *mus ko'ge an*, **INDIANS** a great family of Indian tribes which formerly lived along the Atlantic coast, south

of Tennessee, and the remnants of which now live in Oklahoma. The Muskogean was an extensive family that varied greatly in different sections of the country. No other Indians have proved so intelligent or made such progress in agriculture as have the members of this great family. The tall and active Creek and the shorter, thickset Choctaw are the two chief types. Their system of government was elaborate and interesting, each tribe living in a village by itself. The western tribes flattened the skulls of their children, and in all tribes they were deformed in some way.

Related Articles. Consult the following titles for additional information:

Chickasaw	Creeks
Choctaw	Seminole

MUSK'MELON, a popular species of melon, so called because it has a delightful flavor suggestive of musk. The term *mush-melon*, sometimes used for the fruit, is simply a misnomer. Of the several varieties, two are in great demand—*cantaloupes* and *nutmeg melons*. The former have a hard, scaly rind, sometimes containing deep furrows. They ripen later than the nutmeg melons. The latter have softer rinds, more or less netted. The distinction between these forms is not known to most people, and the name *cantaloupe* is applied for the most part to both kinds. Muskmelons, like other members of the gourd family, grow on vines. They require a warm soil of moderate fertility. As a table fruit they are about as nutritious as peaches, pears or oranges.

MUSKOGEE, *mus ko'ge*, OKLA., the county seat of Muskogee County, situated 150 miles northeast of Oklahoma City, on the Missouri, Kansas & Texas; the Kansas, Oklahoma & Gulf; the Midland Valley, and the Saint Louis & San Francisco railroads. Two of them maintain repair shops here. Muskogee occupies a commanding position with respect to the oil and gas fields of the eastern part of the state. A first-class airport is maintained. The city has several office buildings eight and ten stories in height, a fine Federal building, a court house, a Carnegie Library and three hospitals. There are 22 parks, and the town is governed by a city manager. Population, 1930, 32,026.

MUSKO'KA, a lake region of Central Ontario, Canada, on the eastern shore of Georgian Bay. It covers an area of about 4,000 square miles and includes a county of the same name. It is dotted with lakes and

contains extensive forests. Three of the largest lakes, Muskoka, twenty miles long, Rousseau, twelve miles long, and Joseph, are connected, and have steamer service in summer. The lakes teem with fish and the forests abound in game, and the region attracts many fishermen, tourists and hunters. The scenery in many places is very beautiful, Bridal Veil Falls of the Shadow River, and High Falls and South Falls of the Muskoka, contributing to the picturesque charm.

MUSK OX, an animal related to both the ox and sheep, so named because of its musky



MUSK OX

odor. Its body is covered with a coat of tufted hair, brownish in color and of great length. The hair about the neck and shoulders is so thick as to give the animal a humped appearance; on the rest of the body it is very long, smooth and flowing. The musk ox is active and agile and climbs mountainous places with ease. The horns broad at the base, and covering the forehead and crown, curve downward between the eye and the ear and then upward and slightly backward. The ears are short; the head is large and broad, the muzzle blunt. Each herd numbers from twenty to thirty members. The food consists of grass, lichens and herbs. The musk ox inhabits the Arctic regions of America, though formerly it was often found in northern parts of the United States, as well as in northern Europe and Asia. The flesh is edible, though it smells strongly of musk.

MUSKRAT, also called *musquash*, a rodent related to the field mouse, found only in North America. It is about the size of a small rabbit and has a tail about ten inches long. It lives usually in streams and moist places, where it burrows in the bank or builds houses of sticks and rushes. It is of considerable commercial importance, on account of its fur, which in commerce is

known as river sable. The muskrat has a strong, musky odor, hence its name. Similar small animals in other countries, notably the ratlike *shrew* of India, because of their odor, are called muskrats.

MUSLIN, *muz'lin*, a fine cotton fabric, woven plain, similar to calico, but less compact. It was first made in Mosul, Mesopotamia, whence its name; afterwards it was produced in India, and it was first imported into England about 1670. The common muslins to-day are manufactured in France, England and America.

MUSSEL, a term popularly given to two groups of double-shelled mollusks, one marine, the other fresh-water. The common mussel is found in the temperate salt waters of Europe and America. Although sometimes used as food, the mussel is chiefly valuable as a pearl producer. The animal has an interesting life history. The eggs, after they are laid, are carried in the mother's gills until the young, which are very minute, are hatched. The tiny animals then attach themselves to the skin of a passing fish and, like the cocoon, encase themselves in a covering in which they grow and develop. When the little mussel is completely developed, it breaks through the covering or capsule and settles to the bottom, where it attaches itself firmly and remains the rest of its life. See MOLLUSCA.

MUSSET, *mü sa'*, ALFRED DE (1810-1857), a celebrated French poet, novelist and dramatist, born at Paris. He received a classical education and published his first verses at the age of twenty. He soon became famous, both for his poems and for his dramatic works, which showed great originality. His several novels also have distinction, but his fame chiefly rests on his poems.

MUSSOLINI, BENITO (1884-), an Italian journalist and soldier to whom political opportunity beckoned in 1922, bringing to him the Premiership of Italy and dictatorship of his country. In the World War he was several times wounded, and he spent months in hospitals. Politically a Socialist, he broke with his party on the question of pacifism when he saw his country drifting toward Communism. The government seemed to him impotent to cope with the increasing flood of Russian propaganda, and he began the organization of a group called the Fascisti to combat the threatened danger to the state.

At the head of thousands of black-shirted Fascists he marched on Rome in October, 1922, and forced the resignation of the Cabinet. As soon as his control was established, the king appointed him Premier, and he framed a Fascist government. By 1925 he was dictator of Italy; he had destroyed the old parliamentary system and the institutions of democracy and had substituted completely the tenets of Fascism. No group was strong enough to oppose his ruthless determination to build up a new system of government on the ruins of the one he had torn down, and all open opposition disappeared. In building the Fascist state he achieved for Italy a measure of prosperity it had not known for years, and maintained a high degree of order and discipline. See FASCISM.

As Mussolini's power became consolidated in Italy, his influence reached outward, and soon he was accounted the most powerful figure in Europe. In 1929 he restored to the Pope a little of the old temporal power of the Papacy (see VATICAN CITY). In 1934 he defended Austria against overthrow by Nazi Germany, and by pretensions of good will, favorable to Italy, sought to preserve a balance among the powers. By 1935 his dreams of restoring to Italy "the grandeur that was Rome" led him to seek territorial expansion for the overpopulated homeland, and he began a campaign which had for its object eventual control, if not outright ownership, of Ethiopia in Africa, neighbor to Italian colonies on that continent.

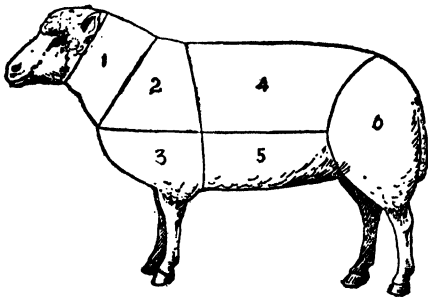
MUSTARD, the common name of two species of plants belonging to a large botanical family of the same name. One of these, *white mustard*, is a dark green plant with straight, branching stems, the lowest covered with bristling hairs. In summer it produces small, brilliant-yellow flowers, and in the autumn very small pods, each containing one row of seeds. *Black mustard* is a weed which at times grows to a height of six feet.

MUSTARD FAMILY, or **CRUCIFERAE**, an extensive order of plants, embracing about 1,800 species. The plants are easily distinguished. The stems and leaves all have a pungent taste, and the flowers, four-petaled, in shape resemble a maltese cross. The seeds of some species are ground into powder and are used medicinally and in cookery, while almost the entire plant of others (cabbage, cress, turnips, radish, horseradish) are used for the table.

MUTINY, the act of refusing to obey military or naval orders by those in such service, or of rising against that authority and acting in defiance of rules and orders. To be mutinous, unlawful conduct must tend to subvert the constituted authority, even temporarily. The punishment for mutinous acts in all armies and navies is very severe.

MUTSUHITO, *müt sü he'to*, (1852-1912), emperor of Japan. He ascended the throne in 1867 and inaugurated a liberal reform policy, including the adoption of a constitution. During his long reign European influence and ideals became firmly established in Japan, and the emperor was credited with much of the country's progress.

MUTTON, the flesh of sheep, a standard meat for the table, having about seven-eighths the nutritive value of beef. After



MEAT CUTS FROM A SHEEP

1, neck; 2, chuck; 3, shoulder; 4, loin; 5, flank; 6, leg.

mutton is dressed it is cooled and allowed to "ripen" before it is put on the market. The carcass is sold to the retail dealer whole, and he usually cuts it according to the diagram here shown. European markets are supplied with mutton by Australia, New Zealand and Argentina. The meat for export is first frozen and then shipped in refrigerator boats. See MEAT PACKING; SHEEP.

MYCENAE, *my cē'ne*, one of the most ancient of the dead cities of Greece which flourished probably 1,400 years B. C., long before the Trojan War. It was situated in the Peloponnesus on an elevation overlooking the Argive Plain, about six miles northeast of Argos. The city was destroyed by the Argives in 468 B. C. Excavations begun at Mycenae in the last quarter of the nineteenth century disclosed relics of a wonderful pre-Hellenic civilization. Cut gems, painted pottery, stone carving and numerous other art objects were found.

MYOPIA, a deformity of the eye, caused by the lengthening of the diameter of the eyeball from front to back. This is usually produced by too great a curvature of the cornea, or crystalline lens. Rays of light entering an eye thus deformed are brought to a focus in front of the retina, causing indistinctness of vision. Persons afflicted with myopia are said to be *near-sighted* or *short-sighted*. The defect is remedied by spectacles with concave lenses. See EYE; SPECTACLES.

MYRIAPODA, a group of animals resembling worms, in having long, slender bodies, which, however, are divided into many rings, rarely less than twenty-four, nearly equal in size and each bearing legs. The legs of some species are very numerous and resemble bristles, but in the higher forms they are jointed, like those of insects (see CENTIPEDE). Formerly these animals were classed with the insects, which they resemble very closely in their larval state, but they now are considered a distinct group of the jointed animals (see ARTHROPODA).

The animal has a distinct head, bearing a pair of antennae, or feelers. Myriapods are usually found in dark, moist places, under logs and in cellars. Some are not visible without a microscope, while others are several inches long. Some species secrete sharp, burning fluids that protect them from their enemies; others are armed with poison fangs.

MYRRH, *mur*, a gum resin which exudes from a small balsam tree growing in Arabia and Eastern Africa. The gum exudes from the bark in oily yellowish tears which harden and turn dark. It was used by the ancients as a fumigant. To-day it is used in medicine as a tonic, a stimulant, a mouth wash and a gargle. The best myrrh is exported from Turkey.

MYRTLE, *mur'tl*, a genus of plants, embracing a number of aromatic and evergreen trees and shrubs. The flowers are either rose-colored or white. Cloves, allspice and Brazil nuts are produced by trees belonging to this family. The *common myrtle* is a native of countries bordering on the Mediterranean Sea and the temperate parts of Asia. The leaves, which contain a volatile oil, have been much used in the East as a stimulant, while the berries, also aromatic, have been used medicinally in Greece and India. In Italy a wine is made from myrtle, and in other parts of Southern Europe the bark of the

tree is used for tanning. Myrtle has been celebrated from remote antiquity on account of its fragrance and the beauty of its ever-green foliage, and by different nations it was consecrated to various religious purposes. The brows of victors in intellectual contests were adorned with myrtle wreaths, and at Athens myrtle was an emblem of civic authority. The running plant known as myrtle in the United States is of a different family and should be called *periwinkle*.

MYSORE, *mi sohr'*, INDIA, the capital of the native state of the same name, 245 miles southwest of Madras and ten miles southwest of Seringapatam. The town is well built, with regular streets and a number of interesting buildings, among which are the maharaja's palace and the residency. Carpet weaving is the leading industry. Population, 1931, 107,142.

MYSTERIES, among the ancient Greeks, and afterwards, also, among the Romans, secret religious assemblies which no uninitiated person was permitted to approach. They originated at a very early period and seem to have had a double object—first, that of handing down the traditions relating to the divinities in whose honor they were celebrated; and secondly, that of teaching and practicing religious rites. The most important Greek mysteries were: 1, The *Eleusinian*. 2, The *Samothracian*, celebrated in honor of the Cabiri. 3, The *Dionysia*, which were celebrated in honor of Bacchus or Dionysus. These were of so immoral a character that they were in time forbidden as injurious to the public peace and morals. 4, The *Orphic*, founded by those who called themselves followers of Orpheus.

MYSTERY, a kind of rude drama, which was a favorite spectacle in the Middle Ages and was presented at solemn festivals. The subjects were of a religious character, and the monks were at first the performers and authors, the performance being in church. Such plays were called *mysteries* because they taught the mysterious doctrines of Christianity. They represented scenes from Scripture history, being thus distinct from the *miracle* plays, which dealt with lives of saints, though the distinction is not always observed. In later times these plays were usually exhibited in a connected series by the guilds of a town, and it sometimes took several days to perform a series. The *Passion of Christ*, the *Slaughter of the Innocents*, *The Creation of*

the World and the *Fall of Man* were among the subjects represented, the first perhaps more frequently than any other. Corpus Christi day was the chief occasion on which they were performed. Mysteries continued to be given from the twelfth to the sixteenth century. Such plays are still given at various places in Roman Catholic countries. The passion play performed at the village of Oberammergau, in Bavaria, every ten years, is a play of this kind. The mysteries were superseded by the moralities.

Related Articles. Consult the following titles for additional information:

Drama
Miracle Play

Morality
Passion Play

MYSTICISM, *mi'sti siz'm*, a religious attitude of mind in harmony with the doctrine of revealed as contrasted with that of reasoned religion. It is diametrically opposed to rationalism, which holds that man should be guided by his highest faculty, reason. The mystic believes that since we cannot with certainty attain to absolute truth by way of the senses or the reason, our only source of light is inspiration and faith, that through these alone we come into direct relationship with God. Mysticism was conspicuous in the philosophy of ancient Egypt, in China and in India, and it has manifested itself in men's minds throughout the intervening centuries.



MYTHOLOGY, *mith ol' o jy*, the collective name given to the body of fables, legends or myths which grow up in almost all primitive nations regarding the creation of the world, the origin of man, the powers of nature and the adventures of the gods and heroes. It is natural that in the savage mind there should arise such questions as: What is the world? What is man? Who made them? Whence came all the natural objects about us? What causes the changes from light to darkness, from heat to cold, from life to death? The attempts to answer satisfactorily these questions gave rise to a certain body of stories, which are known as *explanatory myths*. Other groups of stories which do not explain, which have no obvious aim beyond that of

mere entertainment, which consist in tales of the adventures of gods and heroes, are called *aesthetic myths*.

We think sometimes of mythology as the religion of the ancients, but it was much more than that. It was their religion, their science, much of their literature. And yet it was none of these things, in just the sense in which we understand the words. All mythologies of which we have any record tell of the supernatural beings who had made and who controlled the universe, and in this sense they were religions; but few of them made any attempt to make people better morally, and in that they differed from religion, as we understand it. The primitive religions, in fact, concerned themselves little enough with morals. They demanded worship of the gods, forms, ceremonies, observances; they forbade, as the worst of sins, anything which might be translated as slights to the deities, or as ceremonial carelessness.

Origin. Much time has been spent, especially of recent years, in the study of mythologies with a view to discovering their meaning, the way in which they arose and their interrelation. Most attention has been given to the myths of the Greeks and Romans, the Egyptians, the Norsemen and the Hindus. For the great similarity which is found in many of the myths of these different peoples, various explanations have been advanced. One is that all of these peoples had a common ancestry, and that their myths and legends date back to the ages before the separation took place. Another, and on the whole more satisfactory, explanation is that with the same primitive surroundings the same questions are likely to arise and similar explanations are likely to be made.

Another question regarding the myths, that as to the method of their origin, has also been answered in various ways. One is that the gods and demigods treated of were originally merely men who were remembered after death for their famous achievements and who came in time to be regarded as more than human. A second theory is that wise men invented those myths in which the gods appear as good and just and beneficent, for the purpose of establishing law among communities through a wholesome reverence for higher powers. This view necessitates the conclusion that the myths in which the gods are represented as capricious, unjust and immoral were later inventions of poets or story-

tellers. Still another view is that all myths were originally the explanation of physical phenomena, but that many of them have lost their original significance. (For a general account of this subject of the growth and explanation of myths, see Gayley's *Classic Myths in English Literature*.)

Grecian and Roman Mythology. These may well be treated together, since the accounts of the creation are practically identical with the two peoples, and since the Grecian gods, with their attributes and legends, were to a large extent adopted by the Romans. All of the striking characteristics of mythology are to be found in Greek and Roman mythology, the best known and in many ways the most interesting of any of these ancient collections of tales and legends. We find stories which concern themselves entirely with the actions and characters of the gods; we find other stories which give explanations, often beautiful and poetic, but far from scientific of nature; and we find still other tales which seem to have no other purpose except to give pleasure—no value except a literary one. It will be interesting to read stories of these various kinds and to become acquainted in some measure with the imaginings of that wonderful people, the Greeks; for the most that is beautiful and attractive in what we call Grecian and Roman mythology comes from the Greeks.

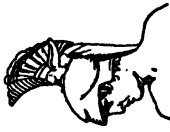
We must remember, when we read stories of the gods, that to the ancients these supernatural beings were not of necessity better, purer, more self-controlled than men. They were only stronger, more clever, more resourceful. When they were angry, they were more angry than men; when they loved, they loved more fiercely; when they were jealous they were more bitter, more relentless, than men. In fact, the beings whom the ancients worshiped as gods were simply beings who did what the people who created them would have done had they been powerful enough. The explanation given in classic mythology of the beginning of all things is that in the beginning there was a vast abyss, known as Chaos. There arose first Earth (Gaea) and love, and from these came heaven and the mountains, the seas, the fields, the animals and vegetation. Of Chaos were born Erebus and Nox (night), and from these in turn sprang light and day. The Titans, children of Uranus (heaven) and Gaea, were twelve in number, and by one of these Titans, Sat-

MYTHOLOGY

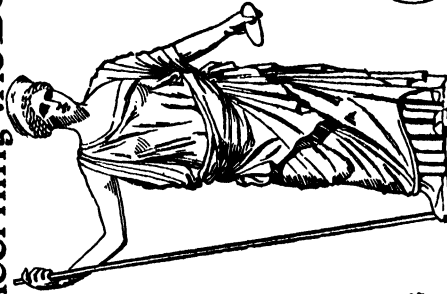
Ancient Beliefs Concerning the Beginning of Things



PANDORA



MARS
God of War



JUNO (from statue in Vatican)
Queen of Heaven
and Goddess of Marriage



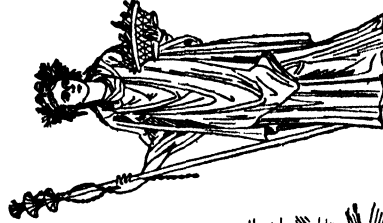
APOLLO
God of the Sun



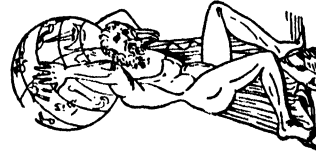
TWO-FACED JANUS
He opened and closed the year,
looking forward and backward.
January is named after him.



CHARON
The boatman to Pluto's shore



CERES
Goddess of Sowing and Reaping



ATLAS
Supporting the World
on his shoulders



VENUS
Goddess of Beauty



THE FATES (from painting by Michael Angelo)
They spun the thread of human destiny and
cut it when they pleased.

H.M.F. & M.

urn, Uranus was at length dethroned. Saturn, with Rhea, his sister and wife, reigned for a time supreme, until he in turn was dethroned by Jupiter, his youngest son. Jupiter divided the universe by lot, he himself receiving the earth and the heavens, Neptune the sea, and Pluto, Hades, the lower world. Jupiter was supreme, however, over his two brothers and over all the other great gods, of many of whom he was the father. Juno, his sister and wife, was the queen of heaven. The great gods who dwelt on Olympus were Jupiter, Juno, Minerva, Mars, Vulcan, Apollo, Diana, Venus, Mercury and Vesta.

One of the best-known stories of Jupiter, the king of gods and men, is that of Europa. Minerva, too, enters into this story.

Story of Europa

Europa, the daughter of Agenor, king of Phœnicia, was so beautiful and charming that everybody who looked at her loved her. But she was young and all unconscious of her charm, and cared little for anything except playing with her young companions in the fields; and there they would stay all day gathering the narcissus, the crocus, the violet, the crimson rose, and twining them into wreaths for their hair and their robes.

One day as they wandered, now here, now there, about the fields near the seashore, calling to each other and holding up any unusually brilliant blossoms which they might find, their attention was attracted to a beautiful snow-white bull that had entered the field and was coming toward them. Ordinarily they would have been frightened at the sight of such an animal; but this bull looked so intelligent, so gentle, so almost human, that they could not feel afraid of him. He advanced until he was in their midst, and they began to throw about his neck and horns the flower wreaths which they had been weaving. At length, Europa said:

"I know what we shall do; we shall mount on the back of the bull and he shall carry us far over the fields and meadows. I know he will not hurt us. See! he seems to understand just what I am saying and to be telling us that he is willing to have us ride on his back."

For the bull had lain down on the grass at the feet of Europa and her companions. Europa first seated herself on his back, and a beautiful picture she made with her purple robe and her flower-wreathed hair.

"Come," she said, "he can carry several of us at once."

But as she said these words the bull, as if declaring that he had no desire to do such a thing, got swiftly to his feet and started across the fields to the sea. Faster and faster he went, and Europa stretched out her hands toward her companions and called to them. Run as they might, however, they could not

overtake her, and when the bull gained the shore of the sea, they were startled and horrified to see him plunge at once into the water. With one hand Europa grasped a horn of the bull; the other she stretched toward her companions. As she found out, however, that no harm came to her, that she was as safe on the bull's back as she could have been in her father's largest sailing vessel, her fear gave place to curiosity and wonder.

"What does this mean?" she asked of the bull, feeling sure that as he had understood when she spoke to her companions, he would surely understand her now, "and where are you carrying me? How does it happen that a bull is able to move in this way as safely over the water as on the land?"

And what was her astonishment to have the bull reply to her in a deep voice.

"I am no bull, though to the most careful eyes I look so. I am the god Jupiter, and seeing you in the field, I loved you, and assumed this disguise that I might carry you off and make you my wife."

With these words he comforted the girl, and we may be sure that her pride was great in having so gained the attention and the love of the greatest of all the gods.

At home, however, Europa's parents knew nothing of this side of the story. Europa's frightened companions had rushed to the palace, calling aloud how the bull, the beautiful, white bull, had run off with their dear comrade.

"Into the sea he plunged," they cried, "and as far as eyes could reach, we could see him swimming safely, while Europa's purple mantle spread out behind her like a sail."

The king was in despair, for he loved his only daughter, and felt that his palace, and indeed, his whole kingdom, would be but a sorry place without her. So he called to him his son Cadmus, and said:

"You are strong and wise for so young a man. I cannot leave my kingdom and my people, but you may set forth now, at once, and search for your sister; and do not, whatever happens, venture to come back without her."

Cadmus was willing enough to search for his sister, for he had loved her and was much distressed at her loss. He set out, therefore, and journeyed, day after day, inquiring of all he met as to whether they had seen a white bull carrying on his back a beautiful girl. All over his own land and far into foreign lands he went; but never a word could he hear of his lost sister. Knowing well his father, and what his wrath would be if his command were disobeyed, Cadmus did not dare to return to Phœnicia; but where else could he find a home?

At length he decided to consult a famous oracle of Apollo in the Castalian cave. Down into the darkness of the cave he went to where the priestess of the god sat, waiting to hear the questions of those who came seeking information. Cadmus put his question:

"Where shall I find a home, now that I no longer dare to go back to Phœnicia?"

Strange sounds came up from the ground which Cadmus himself was unable to interpret. The priestess, however, translated them for him.

"Follow the cow," she said, "follow the cow."

In vain Cadmus begged for a full explanation; the priestess would say nothing more, and he returned to his companions from the darkness of the cave not much wiser than when he had entered. What cow was he to follow? As he stood in deep thought he lifted his eyes and saw a cow walking in a leisurely manner down a path but a little distance from him.

"This as well as any other," he said, beckoning to his companions, and they set off to follow her.

She went on for some distance, Cadmus keeping close behind her, and at length she stopped, looked about, and quietly lay down. This then, if Cadmus had understood the oracle aright, was to be his future home. He stooped down and kissed the ground and made his followers do the same; and he then sent them out to see whether there was in the neighborhood any pure, clear water. They carried with them jugs which they were to bring back full if possible. They passed across the fields into a little grove which looked wild and untouched as though no man had ever set foot in it. Presently they heard a sound of gushing water and looked about them hopefully. Yes, there out of the darkness of a cave there flowed a clear little stream. They bent and drank, and then lowered their jugs into the water. The jugs began to fill with a gurgling sound which was pleasant enough to their ears; but soon they heard another sound which caused them to look up in terror.

Dragging his glittering length across the leaves and the stones, there came from the depth of the cave a monstrous serpent, the guardian of the spring. In vain the men scrambled to their feet and attempted to flee. Terror held them rooted to the ground, and the venomous dragon was upon them; and not one of them escaped the monster's fangs or tightening coils.

Cadmus waited long for his companions and then, when they did not come, he set out in search of them. In the little grove which he had seen them enter he too heard the sound of running water, but when he came to the side of the spring, he found his dead companions with the shimmering serpent coiled up beside them.

After a severe struggle, in which he more than once despaired of his life, Cadmus slew the dragon, and as he stood looking down upon the monster, he heard a voice say, close beside him:

"Bury the dragon's teeth and see what will happen."

He looked about hastily, but could see no one. It was indeed the goddess Minerva, who, invisible to him, had watched the conflict and was now giving him advice. This he was very quick to follow.

Cadmus plucked out all of the teeth of the dragon, and a great number there were, for the huge mouth had had three gleaming rows. These he took back to the field and planted in the soft, moist earth. He had not long to wait before something bright began to appear above the surface of the ground. First the tips of spears, then the glimmering points of helmets, then the heads and shoulders, and, finally, the whole bodies of stalwart men pushed up through the ground before him until the field was full of armed men in ranks. Was this a new enemy which he had to fight? If so, he might as well begin the conflict first as last, and he rushed toward the nearest man. Before he reached him however, this man cried out:

"What part have you in our civil war?" and turning to the soldier nearest to him, who was so exactly like him that Cadmus could never have told the difference, he struck him a sharp blow with his spear. Instead of striking back, this soldier thrust his spear at the man on the other side of him, and soon the whole field was in an uproar. But in an incredibly short space of time the dragon-tooth warriors had almost all perished; indeed only five remained. These ceased their strife and came and knelt down before Cadmus saying:

"Let us help you to build your city. We choose you here as our king."

And thus there was begun in this place, where no city had before existed, a city which grew and became powerful and attracted to it people, from all nearby lands. But Cadmus, the king, never heard again of his sister Europa, whose loss had been the beginning of all his adventures.

As proof that the gods and even the goddesses could be very cruel when mortals did not act to suit them, we may take the story of Arachne.

The Story of Arachne

Arachne had many things of which she might have been very proud; she was young, beautiful, and had many friends. But she cared less for any of these things than she did for the fact that she was a very skillful weaver. People came from all the country near her home to see the beautiful patterns which she wove on her loom; and as they watched the web grow under her fingers, they would exclaim:

"Surely Minerva herself must have taught you; in no other way could you have learned to do such wonderful work."

Most girls would have been proud to have been taken for a pupil of the wisest and most skillful of the goddesses, but Arachne was so proud that she could not bear to have people think that even Minerva ever could have taught her anything. Finally her boasts came to the ears of Minerva herself. Now Minerva was not naturally cruel or revengeful, but there was a wickedness in any mortal's setting herself up to surpass a deity which even Minerva could not pardon. Determined, however, to give the boastful girl a chance, Min-

erva took the form of an old woman and went to Arachne's home.

"Foolish girl," she said, "how do you dare to set yourself up as an equal in skill to the goddess of the arts? Do you not know that she could punish you severely for such boasting?"

"Let her!" said Arachne. "I am her equal, and I am willing that she should know what I have said. Let her come and match her skill with mine. And if I am beaten I will pay the penalty."

"Foolish girl!" cried the goddess, dropping her disguise and appearing in her own radiant form; "the trial shall take place here and now."

All those who stood by were terrified; some of them fell at the feet of Minerva; others besought Arachne to yield before it was too late. But the proud girl remained defiant, unafraid.

So the goddess began, while the bystanders stood breathless with fear and admiration. Minerva at her loom worked rapidly, the shuttle seeming to fly as she passed it back and forth through the threads; and a marvelously beautiful pattern soon began to show itself in the web. But Arachne's web seemed, to those who watched, little, if any, less perfect than that of the goddess herself. Only what was this which the reckless girl was daring to do? Not content with defying one of the gods, she chose for her subject in the web she was making the faults and failings of the dwellers on Olympus, showing them so clearly that nobody could mistake.

Her own web finished, Minerva turned and looked at Arachne's. It was wonderful—the goddess could not but admit it to herself. But the presumption! the wickedness of it! thus to hold up the faults of the gods before these staring people.

With her shuttle she tore the beautiful web of Arachne from top to bottom, and then turned to the girl herself.

"Your sin merits death," exclaimed the angry goddess, "but death shall not be your portion. Since, however, you have been so fond of weaving, your punishment shall be, that forever and forever you and your descendants shall make your threads and weave your webs. And wherever men see you they shall tear your webs as I have torn this, and shall drive you from them as I drive you from me now."

And touching the girl upon the forehead, she transformed her into a spider.

This story has a hint in it of the nature myth. We can perhaps imagine that watching the spiders spin their endless threads may have suggested to some imaginative Greek the possibility of the spider's being but a mortal transformed to this low form as a punishment. In other stories which we may study, however, the nature element is far stronger.

Phaethon

When the boys with whom Phaethon played about the fields and river banks boasted of

their fathers, Phaethon was silent. His mother, he knew, was more beautiful than the mothers of his friends; his grandfather was a wealthy, honored man; but his father—he knew nothing whatever about a father. This was bad enough, but when his playmates began to see that such was the fact, they made him suffer constantly.

"No one can play in this game unless he can tell who his father is," one would cry mischievously.

"Let's spend our time telling about the greatest deeds our fathers ever did," another would suggest.

An Phaethon, ashamed and angry, would rush home to his mother and pour out his wrath and shame.

"Some day, Phaethon," she would assure him, "you shall know about your father, and then none of the other boys will dare to taunt you."

"But I want to know now!" Phaethon would insist, stamping his foot.

"You are too young yet, my son," Clymene would reply, looking sadly at her son.

At length one day when Phaethon had grown to be a tall, handsome lad, he came into the house in a fiercer state of anger than usual.

"I will endure this no longer!" he cried. "Either I shall be able to tell those insulting boys tomorrow who my father is, or I shall never look them in the face again."

Clymene smiled. "Come here, Phaethon," she said, "and let me whisper something in your ear."

What he heard made the boy look first astonished, then delighted; and he rushed out-of-doors and back to the place where he had left his comrades, radiant with joy.

"Now let's tell tales of the deeds of our fathers!" he cried.

And the other boys looked at him in surprise.

"But you have no father," one of them declared.

"O haven't I!" replied Phaethon, no longer angered by the taunt which had so many times stung him. "You see him every day when he drives his chariot across the highest part of the heavens. He is Apollo, the sun god."

A burst of laughter greeted this proud statement.

"Oho!" cried the boy. "Why could you not have made up that story some years ago and saved yourself a great deal of embarrassment?"

"Do you actually expect us to believe that?" asked another, with a sneer.

Disappointed, angry, Phaethon turned again toward home. Having a father was as bad as not having one, if you could not convince other people of his existence.

But his mother was ready to help him out of this difficulty. Looking at him proudly, she said:

"No father would be ashamed to acknowledge you as his son. Tomorrow morning you may go to Apollo, and ask him whether what I have told you is not the truth."

The impatient boy could scarcely wait for the morning to come, and long before day-break, while the stars and moon were still to be seen in the sky, he started off toward the East, traveling as rapidly as he could. At last he came to the gorgeous palace of the Sun and was admitted within the doors to the very throne-room of his father. There, on the diamond-stubbed throne, sat the radiant god, wearing a purple robe and bearing on his head the crown of beams.

"Who are you," he asked, "who have come here to my palace? It is almost time for me to set out on my day's journey and I have not long to talk with you."

Impulsively Phaethon poured out the story of his wrongs, and ended with a plea that his father would give him some sign by which he might convince his skeptical comrades. Apollo laid aside the beams from about his head, which were so dazzling that the youth could not approach closely, and called the boy to him.

"To be sure you are my son," he declared, "a son whom any father might be proud to own. I am willing to give you any proof of the fact, and I swear by the River Styx—and that is an oath which even the strongest of the gods would not dare to break—that I will grant you any wish which you may ask of me."

This was precisely what Phaethon had hoped for, but had hardly dared to expect, and it did not take him long to give his answer.

"There is one thing," he declared, "which will really be a proof. Let me drive for one day your great chariot across the sky; then no one who sees me can doubt that I am your son."

road slopes downward so rapidly that it is almost impossible to hold in the horses. If it is hard for me, think what it would be for you."

But Phaethon refused to think. He had set his heart on this one thing and this one thing he would have. He knew his father could not break the oath which he had sworn by the River Styx, so he persisted in his demand. At last, attended by the Seasons, the Days, the Months, the Years, and the Hours, Apollo led the way to where the sun chariot stood waiting. It was the most gorgeous chariot that Phaethon had ever looked upon—of gold and silver and precious gems; and his heart beat proudly that he was actually to have the guiding of the magnificent car for a whole day. The horses were led forth and fastened to the chariot, and Aurora, the goddess of dawn, threw open the doors of the East, through which the sun in its splendor was presently to rise. After a final plea, which Phaethon stubbornly resisted, Apollo anointed the boy's head with ointment so that he might not be scorched by the brightness of the beams, and then set the crown of rays on the young head.

"Remember, my son," he said, "do not drive too high or too low; a middle course is best. Above all, do not attempt to use the whip, for the horses are spirited; and hold tight to the reins."

Only half heeding his father's instructions, Phaethon sprang into the chariot, grasped the reins, and shaking them over his steeds, started out through the open door.

It did not take the horses long to feel that it was an unpracticed hand that grasped the reins, and, taking the bits in their teeth, they



THE HORSES DASHED OUT OF THE TRAVELED ROAD

Now Apollo was very sorry for the rash promise which he had made.

"Choose something else, my son," he begged; "what you have asked for is not safe. You can have no idea of the dangers of the path across the heavens. The road at the beginning of the journey slopes upward so steeply that even my horses can hardly climb it; the middle of the road is so high above the earth that even I, myself, become dizzy when I look down; and the last part of the

dashed out of the traveled road and wildly up the heavens. The courage with which Phaethon had started out did not last long. Below him—a dizzying, sickening distance below—was the earth and the sea. What if he should drop from this awful height! And there, when he looked about him in the heavens, were even worse sights; the Big Bear and the Little Bear, the Scorpion and the Lion, the huge Crab—all of these seemed to be reaching out toward him as he dashed among

them. Up, up, up, went the horses, and then as suddenly downward, almost taking the breath from Phaethon's body with their rapid plunge. They came so close to the earth that mountains which for thousands of years had been snow-crowned lost their snow-caps and stood bare and brown; rivers were dried up; a great part of Africa was burned to a desert; and many of the people were scorched almost black.

Phaethon had long before this dropped the reins, and he stood shaking with terror. Cries came up to him from the earth, cries of pain and terror and fright from the people of the countries over which he was passing. But he was too much afraid for his own safety to worry about others.

The cries did, however, reach the ears of Jupiter, the king of the earth and heavens, where he sat on his throne on Olympus, and he, horrified, looked out upon the course of the wild boy. The other gods and goddesses gathered about him and besought him to save the earth.

"There will be no beauty, no freshness left," they cried. "There will be no cool springs and lakes for the nymphs to live in; no great trees and forests where dryads may shelter themselves."

"I call you all to witness! There is no other way to save the earth but this!" cried Jupiter, and he raised his arm and hurled a bolt of lightning at the luckless Phaethon.

Struck from the chariot, the boy fell headlong into a great river, while the horses trotted quietly across the remaining part of their course and disappeared into the doors of the West.

It may seem to us as at first we read this story through that it is simply a fairy tale, like those we have been used to hearing all our lives; but to the people who created the tale in the far-off country and the far-off time it was much more than a fairy tale. They could not understand the periods of drought which occurred sometimes and dried up vegetation and rivers, and made fresh lakes shallow and stagnant. Why should Apollo, the god of the Sun, allow his chariot to cause such destruction? There was only one way to account for it—somebody else must be driving the chariot. And thus gradually grew up the story of the rash son of Apollo, who compelled his father to let him take his place and caused such great destruction thereby. The lightning-bolt which Jupiter hurled at the boy signified to them the thunder-storm which so often follows a dry period.

We are not to think that any one man or any hundred men ever said: "Let's invent an explanation of drought," and then made up this story. The tale grew up gradually, a little here, a little there, until it came to have the form in which we have just read it.

There is another nature story which is to the full as famous as that of Phaethon. It will be interesting to see, as you read it,

whether you can get, in any degree, the meaning of the story. However, you need not be discouraged if you do not, for the tale is in itself interesting enough, even if we did not know that it had a meaning.

Story of Proserpina

Ceres, the goddess of agricultural, was one of the busiest of the deities. In the spring-time, she had to go about from field to field all over the earth, attending to the sowing of the seeds; in the summer, she watched the growth of the grains and fruits; and in the autumn, she went about from place to place blessing the harvests. Her car bore her swiftly, and she so loved the helpful work she did that she never grew tired. Still, she was always glad to come back to her home and to her beautiful daughter Proserpina, whom she loved very dearly.

Like her mother, Proserpina had her duties to perform, though they were not as difficult as those of her mother. She had charge of all the flowers, and in the springtime, when she walked across the meadows, violets and daisies and buttercups sprang up in her footsteps. Naturally, she loved the flowers, and spent much of her time in the fields with her companions tending them and gathering them "or wreaths.

One day, as the girls played in the meadows, they heard a strange rumbling sound and looked up hastily. A huge, dark chariot with dark horses and a handsome but gloomy-looking driver was coming toward them. The girls screamed in terror and started to scatter. But the driver stopped his chariot, leaped to the ground, and seizing Proserpina, bore her away with him in his chariot. The frightened girl called to her companions and to her mother, but the black horses carried them on too swiftly for any help to follow her. Meanwhile the stern-looking man explained to Proserpina that he was Pluto, king of all the regions below the earth; that he loved her and wanted her for his wife.

Proserpina answered:

"I must tell my mother; she will be wild with grief when she finds that I am gone and knows not where to look for me."

But Pluto shook his head.

"She would never let you go with me," he declared.

While they were talking thus, they had come to the margin of the River Cyane, which opposed their passage. Angrily, Pluto struck the ground with the great trident which he carried, and the earth opened and made him a passage back to his underground kingdom.

The darkness in which they found themselves after the earth had closed behind them was delightful to Pluto, whose eyes were tired with the glare of the sun; but to Proserpina it was nothing less than horrible. All her life she had been used to living out of doors from daylight to dark; and now this was far, far worse than the blackest night she had ever seen.

"You will like it when you become accustomed to it," said Pluto, noticing that the girl trembled as she sat beside him.

Gradually the way grew lighter, though the light was white and ghostly—not like the beautiful golden sunlight of the upper world.

When they came at length to the huge palace of Pluto, he expected Proserpina to exclaim with delight over its gorgeousness; for Pluto owned all the gold and silver and gems that lay hidden in the earth and had made good use of them in decking his palace. But Proserpina was not used to gorgeousness. She and her mother had lived simply always, and the rich gems which she saw about her were less to her than a handful of fragrant flowers would have been. And all the jewel-studded lights, which to her seemed to serve only to make the gloom more noticeable, she would have exchanged for one look at the stars.

It was the same way with the food. All her life she had eaten but the plainest dishes—simple grains, fruits, bread and milk. And the rich food which Pluto ordered to be placed before her seemed so strange that she would not even taste it. This went on for several days, Pluto, in great distress, urging her to eat, and she as steadily refusing.

Meanwhile her mother had been almost distracted with fear and grief. The girls with whom Proserpina had been playing could tell her nothing except that a man in a black chariot had carried off her daughter. Who the man was, she could have no idea. She sought day and night through one country after another for her daughter. The sun, when he came through the doors of the East in the morning, saw her wandering on, stopping everyone to inquire for her lost girl; and the evening star found her still at her task. One day, as she sat for a few minutes resting on a stone, an old man with a little girl passed her. The goddess bore about her no signs of her divinity; she looked like a poor worn-out, old woman, and they took pity on her and begged her to go home with them. At last she consented to do so, and as they walked the old man told her that his little son was very sick of a fever.

When they reached the house they found that the child had grown rapidly worse, that he was, in fact, almost dead. You may imagine the delight it caused when Ceres, taking the child in her arms, kissed him and thus restored him instantly to health. Then she asked that she might be allowed to take charge of the boy. Of course the family was only too glad to have so excellent a nurse; but the mother, over-anxious for the son in whose sudden recovery she could scarcely yet believe, determined to hide and watch what happened; and it was, indeed, a startling sight which she saw.

Ceres bathed the boy, murmured some magic-sounding words over him, and then, stepping to the hearth, raked a hollow in the glowing coals and laid the boy within it. The watching mother sprang forward with a cry and snatched her child from what she believed

would have been its death. But what was her amazement, when she turned around, to see before her not the feeble old woman whom her husband had brought home, but the radiant goddess Ceres, with her hair of gold and a wreath of wheat and scarlet poppies. Ceres spoke sadly but not angrily:

"I would have given to your son," she said, "immortality. Now you, by your failure to trust me, have taken from him that gift."

And with these words, the goddess vanished.

Her search still continued, and finally, when it seemed that everything was in vain, Ceres became angry with the earth which had failed to aid her in her search and laid her curse upon it. Drought and famine, she declared, should extend over the whole earth; nothing green should grow; there should be no seed-time, no harvest, until her daughter should come back to her. In vain the people implored her, in vain tales of their suffering came to her ears; she, usually so gracious and kindly, was cruel enough now.

At length she found a clew. The River Arethusa, which comes up from the underworld, had seen in the kingdom of the underworld a queen who looked, she said, most like Proserpina. She was pale and sad, and the white poppies which she wore in her hair were very different from the bright flowers she had been so fond of wearing. But still, beyond a doubt, thought the river Arethusa, it was Proserpina. Ceres knew not whether to be glad or sorry. Her daughter was found, but found where? She went to the meeting-place of the gods on Olympus, which she had not visited since the loss of her daughter, and implored Jupiter to use some means to have her daughter brought to her. All the gods felt sorry for Ceres, and they felt sorry, moreover, for the people on the earth, whom Ceres' grief was causing to suffer. At length Jupiter summoned Mercury, the messenger of the gods, and sent him to the regions of the underworld.

"I will do my best," said the king of gods and men, "but the Fates are even stronger than I, and they have declared that if your daughter has eaten anything while she has been in Pluto's realm she may not again come back to the light of day."

When Mercury reached the kingdom of Pluto and stood before the king and the sad-eyed queen, he himself felt sorry for her and hoped that he should be able to take her back with him. When it became known, however, that Proserpina had eaten a few of the seeds of a pomegranate, Mercury shook his head in despair.

"It cannot be," he said, and he went sadly back to the assembly of the gods, leaving Proserpina more hopeless than before.

At length, however, the Fates agreed to make a decree less severe, and declared that though Proserpina must spend six months of every year with Pluto in the dark underground kingdom, the remaining six months she might spend with her mother on the earth.

You may imagine the delight of Ceres when it came time for her daughter to return to her

for the first time. She stood anxiously at the door of her cottage, waiting, watching while the former companions of Proserpina stood about where they might welcome her. Suddenly there seemed to be a new freshness in the air; the grass in the meadows, long dry, grew green before their eyes, and purple violets and yellow buttercups started up all about them.

"She is come!" they cried, and sure enough, she was advancing toward them across the meadows, her hands outstretched, her garments blowing in the breeze, no longer the sad, white-faced queen of the underworld, but the old glad Proserpina who had left them long before.

This is a weather myth. Why, the old Greeks asked themselves, should the goddess Ceres, so kindly, so bountiful through a part of the year, withdraw all of her blessings through the winter months?

It must be, they declared, that she was grieved or angry about something; and gradually this tale grew up of the loss of her daughter and her long search. The descent of Proserpina each year to the underground regions meant the coming of winter, when no

mained a maiden at home in her father's house, long after all her companions were married. And this was not because she lacked suitors. Young men, handsome, strong, rich, fearless, came constantly to her father's palace, seeking her in marriage, and it was not because the king refused his consent that they went away unhappy.

Atalanta herself was the cause of their unhappiness, for she had made a vow that she would not marry, but would devote her life to the chase, like the goddess Diana, whom she so much admired. It was hard, however, to be constantly refusing without having any good reason that was apparent, so she made up her mind to give a different answer to her suitors—an answer which would leave them no argument. Accordingly, when the next youth presented himself, she replied:

"I shall marry the man who can defeat me in a race; but everyone who tries and fails shall be put to death."

This may sound as if Atalanta was a very cruel princess, but her idea was simply to keep people from bothering her with the question of marriage. However, her resolution did not have the effect she expected, for there were still found young men who were anxious enough to have the princess for a wife to submit to the trial which she proposed.



ATALANTA'S RACE

flowers bloomed and no seeds sprouted. The return to the upper world, on the other hand, marked the coming of spring.

There are some of these old myths which may possibly have meant to the Greeks more than they mean to us. The following story is to us but a story; we can see in it no figurative meaning. It is, however, possible that such a meaning may originally have existed. But the tale is interesting enough simply as a story:

The Story of Atalanta

The king of Boeotia had one daughter, Atalanta. While she was more beautiful than any other girl in her father's kingdom, she re-

Now, Atalanta could run as swiftly as the deer she hunted in the forests, and however much a youth might pride himself on his speed, he was certain to find it was no match for hers. A number of suitors had met their deaths by reason of their love for her, and the people of her father's kingdom were beginning to murmur among themselves at her cruelty. One day there acted as judge in one of the races a youth, Hippomenes, by name, who had never before seen Atalanta. As he took his place in the judge's seat, he said to himself, looking around at the crowd which had gathered to witness the race.

"How can any man be so foolish as to risk his life for the sake of this one girl when there are so many beautiful girls to choose from?"

But when he saw Atalanta step forward, ready for the race, he changed his mind; for never, he felt sure, had he looked upon any-

thing so beautiful, and he found himself hoping that the youths who ran with her would be defeated.

And as she ran she looked even more beautiful. Her bright hair blew backward in the breeze, a lovely color flushed her face and her gracefulness in running was wonderful to look upon. Of course she won, as she always did, and the youths who had made trial of their skill with hers were mercilessly put to death. Even this, however, did not frighten Hippomenes.

"What glory," he said to her, "can there be in defeating weaklings like those who just ran with you? Tomorrow, if you will, I shall try my speed and endurance against yours."

As Atalanta looked at him, she felt that she would scarcely wish to defeat this young man, so handsome did he look, so brave, so worthy to be her partner. Still she only nodded her head and made up her mind that she would give him as hard a trial as she had given the others.

Now, Hippomenes knew, having seen her run, that he could never hope to conquer her in a fair race, but he thought:

"There are ways in which it can be managed. Every girl is curious, every girl likes beautiful things."

Accordingly, the next day when he took his place beside Atalanta in the starting line, he had in the front of his robe three beautiful golden apples. As the signal for starting was given, the two sped forward, side by side. For a moment it seemed as if he would actually outrun her, but with a fleet step she passed him. Instantly he seized one of his golden apples and tossed it a little ahead of her. She caught her breath, almost stopped, but her desire to win was strong; however, the beautiful golden sphere looked so tempting that she hastily stooped to grasp it. Running with all his might, Hippomenes threw a second apple, and again Atalanta slackened her speed and seized it, yet kept fairly ahead of her fellow contestant. Almost despairing, Hippomenes tossed slightly to one side of the course the third apple, the largest, ruddiest, most beautiful one of all.

This was too much for the princess. She stopped suddenly, her draperies whirling about her, stooped, and seized the apple. The delay was but for a second, although longer than on the two previous occasions, but that was all Hippomenes needed. He passed her and with a final rush, reached forward, and touched the maple goal. He had won! and the cheers of the people told that they were glad that at last their beautiful, haughty princess had been conquered.

And as Atalanta came toward Hippomenes and held out the hand in which lay the beautiful golden apples, all could see that she looked far more happy in her defeat than she had ever looked before in all her victories.

Some of the myths told by the ancient Greeks were on the border-land between mythology and history. It is probable, for in-

stance, that the tale of the Argonautic Expedition (see *Jason and Argonauts*) had its rise in a voyage of discovery, although, of course, all historical reference to such a voyage is now lost. The story of the siege of Troy, likewise, the most famous of all the tales that have come down to us, was, probably, an outcome to some war which Greek chieftains waged with some people in Asia Minor. The innumerable legends which grew up around this conflict were used by Homer and Vergil as subjects for their great poems, and it is these poems, the *Iliad*, the *Odyssey*, and the *Aeneid*, which have made the story of the siege of Troy and all the wonderful happenings which were caused by it, so well known to us. Attempts at historical accuracy are mingled in all three of these poems with accounts of the part taken by the gods in human affairs.

The Trojan War

The original cause of the fierce conflict was simple enough. The sea nymph Thetis, at the time of her marriage with Peleus, invited to the wedding of the immortals, except one—Eris, the goddess of discord. If Thetis had thought, however, to avoid trouble by slighting Eris, she soon found her mistake; for the goddess, enraged at the slight, threw among the guests a golden apple on which were inscribed the words, "For the fairest." Juno, queen of the gods, Venus, goddess of love and beauty, and Minerva, goddess of wisdom and the arts, each claimed the apple, and they appealed to Jupiter. He, however, was unwilling to bring upon himself the wrath of two of the goddesses by deciding for the third. And he therefore sent all three to another judge.

The judge chosen in the delicate matter was Paris, son of Priam, king of Troy. At the birth of the prince it had been foretold that he would bring much trouble to his country, and in an attempt to avoid the outcome of the prophecy Priam had Paris exposed to die on the mountain side while he was but a child. A shepherd, however, who found the beautiful boy, brought him up as his son, and at the time that Paris was called upon to make his momentous decision he was acting as shepherd on Mount Ida.

The three goddesses appeared before him and stated their case, and not content to allow him to judge as his eyes directed, each of them offered him a bribe. Juno declared that if he decided for her, he should have power and riches; Minerva promised him fame in war; Venus, the most beautiful woman on earth as his wife. Paris was not influenced by this offer of Venus, for he had a wife, a beautiful nymph, Oenone. However, looking upon the marvelously beautiful face of Venus, he felt that he could not award the prize to anyone else. By this decision, he won for himself the hatred of Juno and Minerva.

Inspired by Venus, although he did not realize that fact, Paris shortly after journeyed to Greece, where he was entertained by Menelaus, king of Sparta. The wife of Menelaus, Helen, was the most beautiful of all women, and it was she whom Venus had promised to Paris.

Urged by Paris, and driven to a decision by Venus, Helen consented to leave her husband and journey with Paris to Troy. Menelaus when he discovered the treachery of his guest and his wife, called upon all the chieftains of Greece to give him aid in punishing the one and bringing back the other. Most of them responded willingly enough to his call—Agamemnon, king of Mycenae and brother of Menelaus, Ajax, Diomedes, and Nestor, the oldest and wisest of all the Grecian chiefs. Ulysses and Achilles did not wish to go, and various means had to be adopted to gain their aid; for all felt that without these two the expedition was certain to be a failure. Ulysses, the craftiest of men, would be able to give them counsel in many difficult places, and Achilles was looked upon by all as the greatest of all Greek heroes. He was the son of Peleus and Thetis, and might well be brave in the presence of enemies; for his mother had bestowed upon him a wonderful gift. She had dipped him, while he was young, in the River Styx, and had thus made his body

pliable, the arms, the provisions which would be required by so large an army. But finally everything was ready, and the chieftains with their thousands of followers assembled at Aulis in Boeotia, ready to embark. But here a vexatious delay awaited them. While hunting, Agamemnon, the commander-in-chief, killed a stag which was sacred to Diana, and the goddess of the chase would by no means allow him to go unpunished. She brought a pestilence upon the army and produced a calm which made it impossible for the vessels to leave port; and the soothsayers, after trying all their arts, declared that the wrath of the goddess could be placated only if Agamemnon would allow his daughter, Iphigenia, to be offered up as a sacrifice.

Agamemnon refused, absolutely, at first, but as there was no other way to appease the angry goddess, he finally sent for his daughter, giving as his reason that he wished to marry her to the hero Achilles before the expedition should set out. The princess was laid on the altar and the knife was almost at her throat, when the goddess, seeing her beauty and innocence, relented, and bore her away in a cloud to be priestess in a temple to Diana.

Favorable winds were now granted, and the fleet set sail for Troy.

Meanwhile, the Trojans had been preparing for the coming of the enemy. Priam, king of Troy, was an old man, and unable to lead his forces in battle, but his sons were strong, active men, and particularly was Hector a leader of whom any army might have been proud. Aeneas, a relative of Hector, was one of the strong defenders of Troy.

When the news spread through the city that the Greek fleet was approaching, the Trojan forces gathered on the shore, but the Greeks drove them back and easily effected a landing.

For nine years the struggle went on. First the Greeks would gain the advantage, then the Trojans; and by the close of the ninth year the affair seemed apparently at a standstill. The Trojans had withdrawn their forces within the walls of the city, and the Greeks were besieging them. At the beginning of the tenth year an event occurred which promised badly for the attacking forces. Achilles, the great pride of the Greeks, became angry with the leader, Agamemnon, on account of a real or fancied insult, and he left the struggle absolutely, taking refuge in his tent and withdrawing all of his forces. This was indeed a blow, and the Trojans might have profited largely by it had it not been just at this point the gods and goddesses began to take a part in the struggle. Juno and Minerva, because their claims to beauty had been ignored by the Trojan Paris, took part against Troy, while Venus and Mars favored the Trojans. Jupiter remained, for the most part, neutral, though often one goddess or another was able to influence him.

Partly because of the withdrawal of Achilles, partly because Thetis, the mother of Achilles, angered at the slight to her son, had petitioned Jupiter to grant a Trojan victory,



THE ABDUCTION OF HELEN

invulnerable to any weapons; only one place, a spot on the heel by which she had held him, could be injured by mortal weapon.

It took several years for the Greeks to prepare for the expedition—to get ready the sup-

the forces of Troy defeated the Greeks utterly, in a battle, and drove them to their ships. A council of war was called, and Nestor, to whom all looked for wise counsel, declared that he could see no way out of the difficulty unless Achilles could be persuaded to return.

Agamemnon at last consented to humble himself before the hero and to petition his aid, and rich gifts were sent by the messengers who were dispatched to Achilles. The latter, however, was firm; he had been slighted and the Greeks might get along without his aid. He even announced that he was going to return to Greece at once.

The Greeks had built a rampart around their ships and the Trojans were besieging them there. Encouraged by the news that Achilles had refused to take part against them, the Trojans broke through the Greek ramparts and would have set fire to the ships had not Neptune offered aid to the Greeks.

There remained one last way of making a plea to Achilles. Patroclus, his relative and his dearest friend, was persuaded to go to him and to report the sorry state in which the Greeks found themselves. Even this, however, did not move Achilles, but he did finally consent to allow Patroclus to don his armor and to place himself at the head of the Myrmidons, Achilles' own special troops.

When he returned to the field, Patroclus found a fierce battle going on. He dashed into the midst of it at the head of his men, and the Trojans, terrified at the supposed sight of the one whom they so dreaded, fled in dismay, even Hector being obliged to flee.

The Trojans, however, rallied and returned to the conflict, and suddenly Hector and Patroclus found themselves face to face. The Greek writers who tell us the story cannot, apparently, bear the thought of Patroclus being really vanquished in fair fight by Hector, so they tell us that Apollo took sides against the Greek warrior, and deprived him of his helmet and his lance. At any rate, Hector obtained the advantage and Patroclus fell, mortally wounded by the Trojan's spear.

Achilles, when he heard of the death of the man whom, more than any other, he loved, was wild with remorse and anger. He was about to rush unarmed into the fight against Hector, who had arrayed himself in the armor of Achilles which he had stripped from Patroclus. But Thetis, his mother, persuaded him to wait until she could get from Vulcan another and finer suit of armor for him.

Impatient at the delay, but recognizing the wisdom of his mother's request, Achilles spent the night in grief for his friend and in ragings against the slayer. In the morning the armor was ready, and a most wonderful suit it was, with its elaborate trimmings of gold. First Achilles proceeded to the council, where he became reconciled with Agamemnon, and then, urging all the Greeks to follow his example, he rushed forth to battle. The Trojans could not stand against the Greek forces, inspired as they were with new courage by the presence of Achilles, and they rushed back into the city.

Hector, however, remained without the walls, determined not to flee; but when he saw Achilles approaching in his flashing armor, with his spear poised, he became terrified and turned to flee. Around and around the walls of the city they fled, Achilles gaining not at all upon Hector; and it is uncertain how the race might have terminated had not Minerva interfered in it.

She assumed the form of Hector's bravest brother, and appearing at Hector's side, urged him to turn and defy Achilles, promising aid. Hector, much delighted, for it was far from being his desire ever to run from an enemy, stood to give battle and instantly hurled his spear with all his strength. Turning to ask his brother for another spear, Hector found that he was alone, and understood that he had been deceived by some deity. Now Achilles advanced upon him and launched his spear with such true aim that Hector fell to the field, mortally wounded. His last words were an appeal to Achilles to allow his body to be carried back to Troy and given proper burial rites, but Achilles answered him brutally. Tying the body of Hector by strong cords to his chariot he drove back and forth before the gates of the city in full view of the Trojan forces and of the grief-stricken parents of Hector. No pleas seemed to move him; he would have vengeance on the dead body of his enemy.

That night, however, the old king Priam went to Achilles in his tent and finally prevailed upon him to give up the body of Hector and let it be borne back to Troy. A twelve-day truce was pledged, that the Trojans might have time for the funeral ceremonies which they felt were the due of their dead leader.

Achilles himself did not live long after the death of Hector. One day, during the funeral ceremonies of Hector, the Greek hero saw a young woman who seemed to him the most beautiful and charming person he had ever seen. Eagerly he inquired who she was, and what was his dismay to learn that she was a princess of Troy, daughter of Priam and sister of Hector. However, he was not to be turned from his purpose; he had determined when first he set eyes on the maiden to make her his wife, and he immediately sent messengers to Priam declaring his desire. For some reason, Priam decided to look favorably upon his suit—perhaps because Achilles had yielded to his plea for Hector's body, perhaps because he thought that the Greek hero might influence his people in favor of the Trojans.

At any rate, a conference was arranged, and the parties met in the temple of Apollo. Paris had not been invited to be present, but he appeared during the course of the negotiations, and his coming meant no good for Achilles. Paris knew that this man was invulnerable in all but one spot, and it was at this spot in the heel of Achilles that he aimed his poisoned arrow. The arrow flew true to its mark, and Achilles fell, mortally wounded. Paris, however, did not enjoy his triumph long, for a Grecian chief in his turn shot Paris with a poisoned arrow. Thus died the man

who had caused all the trouble, who had brought distress to two entire peoples and death to hundreds of brave men.

And now a prophecy came to the ears of the Greeks. There was in the city of Troy a statue of Minerva, supposed to have fallen from heaven. It was called the Palladium, and was looked upon as the guardian of the city. Until the Greeks should gain possession of this Palladium, the prophecy ran, they could not hope to capture Troy. At the risk of their lives, for the statue was well guarded, Ulysses and Diomedes entered the city in disguise, stole the statue, and bore it off to the Grecian camp.

But even this did not seem to bring decisive victory to the Greeks. Their confidence in their own power was lessening, and they began to argue that if they could not subdue the Trojans with the aid of Achilles, they could never make head against them now. Here the crafty Ulysses came to their aid.

their ships and hide them behind a near-by island. They left something behind them, however—something which filled the Trojans, when they poured forth out of the city gates and across the plain, with curiosity and amazement. This was a huge wooden horse, the purpose of which they could not guess. Had they known that it was hollow and full of armed Greeks, they would have left it on the sands, or have burnt it, but as it was they gathered about it and wearied themselves with conjectures as to its use.

"Let us take it into the city," cried some, "and present it as a gift to Minerva."

"Let us not touch it," exclaimed others. "Who knows what harm it may do us?"

Most determined of all in his command that the horse be let alone was Laocoön, priest of Neptune.

"What would you do?" he cried. "Have you not learned that the Greeks are never to be trusted? For my part, I fear them even when



THE GREEKS LEFT BEHIND THEM A HUGE WOODEN HORSE

"If we cannot take the city by force," he declared, "we can do it by stratagem." And he laid a plan which all the Greek leaders declared to be certain of success.

First they allowed it to be noised abroad, so that it came to the ears of the Trojans, that they had given up the siege and were returning to Greece. And they did indeed, withdraw

they offer gifts." And with these words he struck the side of the horse with his lance.

Had the people been wise, they might have guessed the truth from the hollow sound and the clanking as of armor which followed the blow, but it so happened they could not quite persuade themselves to give up this curious object.

Meanwhile, another part of the scheme of Ulysses was put into action. A Greek was here dragged forward by eager Trojans, who declared that they had captured him and demanded that he tell his story. With apparent reluctance and terror, he replied to their questions. Yes, he was a Greek. His name was Sinon, and he had been cruelly treated by Ulysses, who had persuaded the Greeks to abandon him when they set sail from Troy.

"But do you know the purpose of the wooden horse?" cried his captors.

"O yes," replied the wily Sinon. "It was built to propitiate the goddess Minerva, who was angry at the theft of the Palladium."

"And why is it so huge?" asked the Trojans.

Again Sinon pretended to be reluctant to tell, but at length he said:

"They have deserved no good at my hands, and I will tell you the truth about the wooden horse. Calchas the prophet assured them that if the Trojans succeeded in getting the horse within their city they would assuredly triumph over the Greeks, and they built the horse large so that you could not get it through the gates."

While the people looked at each other, not quite convinced as to Sinon's good faith, a remarkable portent occurred. Out of the sea there glided two monstrous serpents, so terrible to look upon that all the crowd scattered in fright. The serpents, however, paid no attention to the crowd, they made their way at once to where Laocoön and his two sons stood. All struggles on the part of the three were unavailing; they were crushed to death in the coils of the monsters, and the people saw in this portent a sure sign of the displeasure of the gods at Laocoön's treatment of the wooden horse.

Without delay they dragged the huge horse into the city, forming a joyous procession about it and singing and dancing in triumph. But their triumph was short-lived. In the night the traitor Sinon let out the men who were shut in the horse's body, and they in turn opened the city gates to the Greek forces, which had returned under cover of darkness. Immediately the whole city was full of the enemy. Fires were started in every quarter; men, women and children were put to death; and the few who escaped the sword took refuge in flight.

Troy had fallen, not through force but through treachery; and the long struggle was at an end.

This story of the siege of Troy is of necessity brief, but the full account of it is interesting enough to repay detailed study. In Homer's *Iliad* and *Odyssey*, in good translations, both in prose and poetry, will be found much that is absorbing and delightful.

Scandinavian or Northern Mythology. These myths were common to all the Teutonic nations, to the Germans and Scandinavians, as well as to the ancestors of the English. The

legends tell that in the beginning there was no world, but only a vast abyss, to the north of which was mist and to the south of which was light. Twelve rivers had their sources in the mist world, and these flowed into the great abyss, where they were frozen. The warmth from the light world melted this ice, and from the mist which arose came Ymir, regarded as the father of the giants, and the cow Adhumbia. The giant was nourished by the cow's milk, and the cow by the salt which she licked from the ice. One day, while she was thus feeding, human hair appeared above the ice; the next day a head came into view, and shortly after the god Bori appeared. From Bori all the gods were descended. Odin and his two brothers, the grandsons of Bori, killed the giant Ymir and of him they formed the earth, making the solid ground from his flesh, the ocean from his blood, the rocks from his bones, the forests from his hair, the clouds from his brains and the canopy of heaven from his great skull.

The great gods, known as the *Aesir*, were twelve in number, and the goddesses were twenty-four in number. These immortals lived in a realm known as Asgard, regarded as some place above the earth. The most of the gods were beneficent in their dealings with man, and in northern mythology there are fewer stories showing the gods as cruel and licentious than there are in the classical myths. Loki, the god of evil, was at first considered not so much the personification of evil as of mere mischievousness. As time went on, however, the conception of him changed, and he came to correspond closely with the Satan of the Christian religion.

In the beginning men lived in perfect innocence and goodness, but with the advent of Loki on earth and with the entrance of the giants into various relations with men, the age of innocence came to an end, and gods and men were involved in a struggle for existence with the powers of evil. One distinctive point of the northern mythology was the belief that a time known as Ragnarök (the Twilight of the Gods) would come, when the rule of Odin and his fellow gods would come to an end, when the powers of evil would triumph, when Asgard with its palaces would be destroyed. They believed, however, that out of the destruction of the old order of things would arise a new heaven and a new earth and that peace and happiness would once more reign.

Wonder Questions in Mythology

How has mythology enriched our vocabulary?

The origin of some of our most familiar words may be traced to names that figure in classic mythology. An interesting illustration is the word *tantalize*, which comes from *Tantalus*. *Tantalus* was a king of *Phrygia* who was banished to the lower regions because he had served the gods with the flesh of his own son. In the realms of *Pluto* he had to stand in a pool with his chin on a level with the water. Tortured by thirst, he again and again bowed his head to drink, but as often as he did so the water swept away from his reach. Trees laden with luscious fruits swayed their branches over him, but ever eluded his grasp. Thus *tantalized*, he spent his days in misery. Another interesting word story centers about the name *Chimera*. The *Chimera* was a fire-breathing monster having the head of a lion, the body of a goat and the tail of a dragon. To-day, any wild, fantastic scheme is said to be *chimerical*. The familiar word *cereal* is derived from *Ceres*, the name of the Roman goddess of agriculture. These are representative of a number of words that are associated with mythology.

What myth can be said to symbolize the Shakespearian phrase, "vaulting ambition which o'erleaps itself"?

The story of *Icarus* and *Daedalus* is suggested by this expressive phrase. *Daedalus* made wings for himself and his son *Icarus*, and fastened them on with wax. As they flew into the air, *Daedalus* warned his boy not to fly too near the sun, but *Icarus*, scorning this warning and desiring to go higher than his father, flew so near the sun that the heat melted the wax. Then the wings fell off and the lad dropped into the sea and was drowned.

What well-known Norse myth symbolizes the conflict between good and evil?

This myth is the story of *Balder*, the pure and radiant god of light. To protect him from harm, his mother *Frigga* sent her servants to all parts of the world, bidding them to exact a vow from all things, animate and inanimate, that they would not injure *Balder*. Every object in creation made the vow except a weak sprig of mistletoe, which grew upon the oak stem at the gate of *Valhalla*. One day while the gods were at play, they began throwing missiles at *Balder*, for they knew none of their weapons could harm him. *Frigga*, who was spinning in her home, heard their merry cries, and asked an old woman who

was passing by what the noise was. *Loki*, in disguise, told the goddess that the gods were throwing stones, spears, darts and other objects at *Balder*, who stood smiling and unharmed through it all. Then the mother related the story of the vows, and added that only a weak little plant, too small to be feared, had failed to make the required promise not to injure *Balder*. When the evil *Loki* heard this he hastened to the gate of *Valhalla*, fashioned a spear from the mistletoe, and sought out *Hodur*, the blind brother of *Balder*. Putting the shaft in *Hodur's* hand, he bade him throw it in the direction of *Balder*. The shaft struck home and the beautiful god fell to the ground slain. In this story *Balder* and *Hodur* are symbols of the opposing forces of good and evil, and *Loki* impersonates the tempter.

Is there any resemblance between classic myths and Old Testament stories?

There are several Old Testament stories that are strangely like Greek and Roman myths, though scholars do not know just what is the relationship between them. The story of *Noah*, for instance, is similar to that of *Deucalion*, for when *Jupiter* had the race of men swept away by a flood, *Deucalion* and his wife *Pyrrha* found refuge on *Mount Parnassus* and were saved. *Samson's* feats of strength remind us of the deeds of *Hercules*, and the dragon that guarded the apples in the Garden of the *Hesperides* may have been the serpent that tempted *Eve*. From these and similar coincidences some authorities reason that all nations at some time came under the same religious influences. This subject, though interesting, is still a matter of speculation.

What familiar figures of speech have their origin in mythology?

There is space here for only a few such sayings and phrases, but they are typical of many others. A man in a dilemma is said to be "between *Scylla* and *Charybdis*," referring to two mythical monsters that destroyed unlucky mariners. A politician who endeavors to remedy bad conditions is sometimes described as one who "cleanses the Augean stables." This refers to the stables of *King Augeas*, which were cleaned in one day by *Hercules*, after having been neglected for thirty years. To be "hit by *Cupid's* dart" is to fall in love; "to be a devotee of the *Muses*" is to pursue art, music and literature; "to be *Argus-eyed*" is to be exceedingly alert; "to be overtaken by one's *Nemesis*" is to suffer just vengeance. These examples could be multiplied indefinitely.

Why should we study mythology?

The old myths are the expression of the religion, the literature and the science of the ancients, and through the study of mythology we learn much about their ideas, manners and customs and mental attitude. Besides throwing interesting light on a bygone age, mythology has an interest all of its own. Many of the stories are nothing less than fascinating fairy tales which appeal to adults and children alike. We find, too, that literature abounds in allusions to the ancient myths, and a knowledge of mythology helps one to enjoy and understand the books one reads.

What are the special characteristics of Norse mythology?

The grand and tragical elements of life receive emphasis in the mythology of the people of the North. Over and over again their myths suggest the unending struggle between the beneficent and the forbidding forces of nature, for this struggle is a perpetual reality in a climate where the brief summer season is ever contrasted with the darkness and cold of a long winter. In the lands of rugged landscapes and fields of ice and snow, where the flashing aurora borealis and the iceberg are familiar sights, a mythology of tragedy and struggle is quite to be expected. Therefore Norse mythology has few of the sweet and idyllic stories that grace the mythology of Southern lands. It is an interesting fact that in Northern mythology the gods are mortal.

How did the Greek conception of the beginning of things differ from that of the Scandinavians?

Both races imagined that the earth was formed out of chaos, but the Greek idea of chaos was that of a vapory, formless mass; in Norse mythology chaos is a mixture of fire and ice, and from these opposing elements the first gods came into being. The idea of fire and ice was doubtless suggested by the extraordinary contrast of elements in Iceland, which has been called the "land of ice and fire." There may be seen ice caps and volcanoes, glaciers and boiling geysers.

Of what is the story of Apollo and Daphne a symbol?

This is one of the myths by which the ancients gave poetic interpretation to a common natural occurrence. Apollo, wandering one day in the forest, saw and loved the nymph Daphne. She was frightened by his advances and fled when he tried to approach her. The god pursued her to the edge of the River Peneus, where, trembling and exhausted, she called on

her father, the river god, for help. When Apollo came up with outstretched arms he embraced a tree, for the father had saved his daughter by changing her into a laurel. Thereafter the laurel was sacred to Apollo. The story symbolizes the effect of the sun on the dew. The sun, enchanted by the beauty of the dew, seeks to come close to it; the dew, in fear, flies from the sun, and when the rays fall upon it, vanishes.

How did the Greeks explain the phenomenon of an echo?

They had a story of a lovely but frivolous wood nymph named Echo, who fell deeply in love with Narcissus, whom she met in the forest. She tried in vain to win his love, and finally, in despair, wandered off into the mountains. There she pined away until only her voice remained. The gods thought that her grief showed lack of self-respect, and they condemned her to wander among the mountain solitudes, always repeating the last sounds that reached her ear.

What is the mythical explanation for the presence of sin and unhappiness in the world?

The story of Pandora is the myth that explains the world's sorrows. Because men had used the divine fire stolen from heaven by Prometheus, they had to be punished for their presumption. In a council of the gods it was decided that women should be sent among men as a punishment, and they ordered Vulcan to create one. He made a lovely creature, to whom Apollo gave musical gifts, Mercury gave persuasive powers, and Venus the gift of charm. So she was called Pandora, meaning all-gifted. The maiden was taken to earth by Mercury and left with Epimetheus, brother of Prometheus. For a time all went well, but Pandora was not wholly happy because of a curious box that Mercury had left, one which he had sternly forbidden her to open. After struggling long with the temptation to open it, her curiosity overcame her one day, and she unlocked the cover and threw it back. To her dismay there flew out of the box all the ills that have ever since plagued mankind—disease, envy, fear, disappointment and so on. Too late Pandora slammed the cover down, but after a time she heard a weak little voice saying, "Let me out." When this had kept up for some time the curious maiden opened the cover and peered in the box to see what was left there. Then out flew a beautiful winged creature that sang as it soared away, "I am Hope." Thus, although the age of innocence was past, and sin and sorrow had come to mankind, still there was Hope in the world, and this meant that suffering would not be too great for men to bear.

Outline on Mythology

I. General Meaning

II. Divisions

1. Myths of explanation of questions asked by primitive man in regard to creation
 - a. What am I?
 - b. Whence did I come?
 - c. What is the world?
 - d. Whence came all nature?
 - e. Causes of light, darkness, life and death, etc.
2. Myths of entertainment
 - a. Tales of adventure of gods and heroes

III. Origin and Theories

1. Gods were mere men remembered after death by their great deeds
2. Wise men invented them for the purpose of establishing law, through the gods appealing to mankind
3. Inventions of poets, storytellers, etc.
4. Myths explained all physical phenomena

IV. Grecian and Roman

1. Creation of all things explained by myths
2. Planets as rulers of universe
3. Universe divided and rulers take different abodes
4. Abode of lesser deities
5. Typical Myths

V. Scandinavian and Northern

1. Explanation of creation
2. Giant Ymir first created
3. Bori, father of all gods, appears
4. Earth then formed from Ymir by Bori's grandsons
5. Twelve gods and twenty-four goddesses

Gods beneficent and kind

VI. Egyptian

1. Many religious myths
2. The stronger eventually led
3. Distinctive belief, soul of man was immortal

VII. Comparison of Different Myths

1. Points of resemblance
2. Points of difference

Egyptian Mythology. This consisted, originally, not in a general or national religion, but in a number of religions which grew up in separate towns and villages. There was never, however, in Egypt a complete fusion of the different religions. One of the distinctive beliefs of the Egyptians was that the soul of man was immortal.

Related Articles. Consult the following titles for additional information:

GREEK AND ROMAN MYTHOLOGY

Achilles	Echo	Nestor
Actaeon	Elysium	Niobe
Admetus	Endymion	Nymphs
Adonis	Erebus	Oedipus
Aegis	Europa	Oracles
Aeneid	Euterpe	Orestes
Aeolus	Fates	Orion
Aesculapius	Fauns	Orpheus
Agamemnon	Flora	Palladium
Ajax	Fortuna	Pan
Alcestis	Furles	Pandora
Amazons	Galatea	Paris
Ambrosia	Ganymede	Pegasus
Amphion	Golden Fleece	Pelops
Andromeda	Gorgons	Penelope
Antaeus	Graces	Perseus
Antigone	Hades	Phaedra
Aphrodite	Harpies	Phaethon
Apollo	Hebe	Philomela
Apple of Discord	Hecate	Pluto
Arachne	Hector	Plutus
Argonauts	Hecuba	Polyphemus
Argus	Helen	Priam
Ariadne	Hercules	Prometheus
Atalanta	Hero	Proserpina
Atlas	Hesperides	Protesilaus
Augeas	Hydra	Proteus
Augurs	Hygeia	Psyche
Aurora	Hymen	Pygmalion
Bacchus	Io	Python
Baucis	Iphigenia	Rhada-
Bellerophon	Iris	manthus
Bellona	Ixion	Rhea
Cadmus	Janus	Romulus
Caduceus	Jason	Sarpedon
Calliope	Juno	Saturn
Calypso	Jupiter	Satyrs
Cassandra	Laocoön	Scylla
Castor and Pollux	Lethe	Selene
Centaur	Mars	Semele
Cerberus	Medea	Sibyl
Ceres	Medusa	Sirens
Charon	Melpomene	Sisyphus
Chimaera	Menelaus	Styx
Chiron	Mentor	Tantalus
Circe	Mercury	Tartarus
Clio	Midas	Thalia
Clytemnestra	Minerva	Themis
Cupid	Minos	Theseus
Cybele	Minotaur	Thetis
Cyclops	Morpheus	Titans
Daedalus	Muses	Troy
Deucalion	Nalads	Ulysses
Diana	Narcissus	Uranus
Dido	Nectar	Venus
Diomedes	Nemesia	Vertumnus
	Neptune	Vesta
	Nereids	Vulcan

SCANDINAVIAN MYTHOLOGY

Asgard	Hel	Sigurd
Balder	Idun	Thor
Frey	Lok	Valhalla
Freya	Nifheim	Valkyries
Frigga	Norns	Yggdrasil
Heimdall	Odin	

EGYPTIAN MYTHOLOGY

Ammon	Apis	Osiris
Anubis	Isis	Serapis

